



SEAL-TIGHT
CAULKING & MASONRY RESTORATION

SAFETY MANUAL

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Seal-Tight Caulking & Masonry Restoration - Safety Program Manual

To: All Employees, Subcontractors and Vendors

A safe and healthy work environment is of utmost importance to Seal-Tight Caulking & Masonry Restoration.

The responsibility of safety officer Rick Antonellis is to implement the safety requirements herein stated at the job site, yard and office. This implementation of our safety policies is accomplished by a comprehensive effort in safety education for all employees, subcontractors and vendors.

This manual is available to interested parties for review at our office and job sites.

Very truly yours,

Rick Antonellis
President – Safety Officer

Management Responsibilities

- * Provide the means to accomplish the Safety Policy.
- * Enforce the Safety Policy.
- * Appoint a Safety Officer.
- * Monitor home office and job site safety activities and take necessary action to correct unsatisfactory performance.
- * Establish and provide safety training.
- * Provide necessary personnel protective gear and safety equipment and materials.
- * Assure continuing support for the program and insist upon adherence by all personnel.
- * Distribute relevant reports, accident data and changes in regulations and codes which affect company operations.
- * Provide advanced planning for all projects to employ engineering and administrative controls which most contribute to the overall company Loss Control Report.

Safety Officer Responsibilities

- * Supervise the Safety Program.
- * Make frequent and regular inspections of the home office and job sites.
- * Identify existing and predictable hazards and require home office and job site management to take corrective measures to eliminate them.
- * Participate in pre-job planning meetings for each project.
- * Organize and conduct quarterly safety meetings.
- * Periodically issue safety bulletins.
- * Review Accident Investigation Reports, ensure required follow-up and corrective action and forward required reports to government agencies.
- * Maintain monthly accident tabulation.

- * Report to management periodically on Safety Program progress, problems and objectives so that management can take action as required.
- * Provide safety training.
- * Fully utilize the assistance of our insurance carrier, safety organizations and other resources.

Project Manager Responsibilities

- * Conduct a pre-job safety planning review at job kick off meeting.
- * Provide job foremen with copies of appropriate safety regulations, accident report forms, safety signs, posters and MSDS sheets.
- * Distribute this safety manual to all subcontractors for compliance with the company safety policy.
- * Monitor job site safety and take necessary action to have unsatisfactory performance corrected immediately.
- * Review all accident reports from assigned job sites and see that the company safety officer receives full reports.
- * Provide job foremen with copies of applicable State and Federal safety bulletins.

Foremen Responsibilities

- * Be accountable for controlling accident losses on assigned project in compliance with these established procedures.
- * Conduct safety meetings and tool box talks and instruct employees in safety practices.
- * Ensure availability of all safety and protective equipment.
- * Maintain close contact with Project Manager to advise them about safety problems.
- * See that subcontractors abide by the Company Safety Policy.
- * Take prompt action to correct unsatisfactory conditions and work practices brought to their attention.
- * See that all injuries are treated, investigated and reported, telephonically and on accident report forms, through the Project Managers to the Company Safety Officer.

- * Assign various safety activities to others as needed but retain the ultimate responsibility for job site safety.
- * Review all accidents with employees. Ensure a thorough investigation and see that immediate corrective action is taken.
- * Inform project management of problems which lie beyond the foreman's authority.

Employee Responsibilities

The eight primary employee responsibilities, outlined below, should be mandatory:

1. Constantly observe work conditions, equipment, and tools for the purpose of preventing accidents.
2. Comply with all job safety instructions. Requires help when unsure of how to perform any task safely.
3. Use all safety equipment which is required on the job.
4. Correct unsafe acts or conditions within the scope of their immediate work. Report any unsafe acts to supervisors.
5. Advise supervisors of any faulty tools or equipment.

6. Stop work if conditions are such that there is immediate danger to life, limb or property.
7. Report all accidents or injuries to the supervisor no matter how minor.
8. **WORK SAFELY**

Subcontractor and Vendor Responsibilities

- * Abide by all job site safety requirements of Seal-Tight Caulking & Masonry Restoration.
- * Notify Seal-Tight Caulking & Masonry Restoration when actions or activities undertaken by them could affect health or safety of employees of other companies.
- * Inform Seal-Tight Caulking & Masonry Restoration of all injuries to workers.
- * Report to Seal-Tight Caulking & Masonry Restoration any unsafe conditions that come to their attention.

Hazard Communications Written Program

- * A list of hazardous chemicals known to be present, using an identity that is referenced on the appropriate material supply data sheet. (This can be the chemical, trade or proper name).

- * The methods employer will use to inform employees tasks and hazards associated with chemicals contained in unlabeled pipes in their work area.

- * The methods employer will use to provide other employers with a copy of material safety data sheets for each hazardous chemical to which the other employer's employees may be exposed.

- * The methods employer will use to warn other employers of any precautionary measures that need to be taken to protect their employees during the work place's normal operating conditions and in any foreseeable emergencies.
- * Methods employer will use to inform other employees of labeling system used.
- * How containers will be labeled, tagged or marked.
- * How Material Safety Data Sheets will be obtained and made available.
- * How employees will be informed about the Hazard Communications Standard, and how training and information requirements will be met.

Material Safety Data Sheets (MSDS)

- * MSDS for all materials utilized on Seal-Tight Caulking & Masonry Restoration projects will be maintained in the job file and on the job site.
- * The project manager shall be responsible to obtain all MSDS for his work as well as any Seal-Tight Caulking & Masonry Restoration subcontractors and vendors.
- * Employees of Seal-Tight Caulking & Masonry Restoration will have access to MSDS.

- * Materials delivered to job sites/yard or office shall, whenever possible, arrive in original containers with original labels. Any materials transferred to other containers shall be properly labeled.

Training

- * All new employees will be provided training in reading and interpreting a Material Safety Data Sheet, the provisions of this policy, and the requirements of the standard.
- * Each new employee will receive generic training to cover the basic types of hazardous chemicals used by the company and training in recognizing the release of hazardous chemicals.
- * Before assigning any worker or crew to a task requiring the use of hazardous chemicals, their direct supervisor will be required to review with them information contained in the Material Safety Data Sheet including safety procedures, emergency procedures and required protective equipment.
- * Information on the written program and copies of Standard, Chemical Hazard List and Material Safety Data Sheets can be obtained by contacting the project manager or Seal-Tight Caulking & Masonry Restoration office at (781) 492-0002.

Hazard Communication Guidelines for Compliance

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

OSHA 3111
2000 (Reprinted)

This informational booklet is intended to provide a generic, non-exhaustive overview of a particular

standards-related topic. This publication does not itself alter or determine compliance responsibilities, which are set forth in OSHA standards themselves and the *Occupational Safety and Health Act*. Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements, the reader should consult current and administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the Courts.

Introduction

OSHA's Hazard Communication Standard (HCS) is based on a simple concept -- that employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring. OSHA designed the HCS to provide employees with the information they need to know.

Knowledge acquired under the HCS will help employers provide safer workplaces for their employees. When employees have information about the chemicals being used, they can take steps to reduce exposures, substitute less hazardous materials, and establish proper work practices. These efforts will help prevent the occurrence of work-related illnesses and injuries caused by chemicals.

The HCS addresses the issues of evaluating and communicating chemical hazard information to workers. Evaluation of chemical hazards involves a number of technical concepts, and is a process that requires the professional judgment of experienced experts. That's why the HCS is designed so that employers who simply use chemicals -- rather than produce or import them -- are not required to evaluate the hazards of those chemicals. Hazard determination is the responsibility of the manufacturers and importers of the chemicals, who then must provide the hazard information to employers that purchase their products

Employers that do not produce or import chemicals need only focus on those parts of the rule that deal with establishing a workplace program and communicating information to their workers. This publication is a general guide for such employers to help them determine what the HCS requires. It does not supplant or substitute for the regulatory provisions, but rather provides a simplified outline of the steps an average employer would follow to meet those requirements.

Becoming Familiar with the Rule

OSHA has provided a simple summary of the HCS in a pamphlet entitled *Chemical Hazard Communication (OSHA 3084)*. Some employers prefer to familiarize themselves with the rule's requirements by reading this pamphlet. A single, free copy may be obtained from your local OSHA Area Office, or by contacting the OSHA Publications Office at (202) 693-1888.

The standard itself is long and some parts are technical, but the basic concepts are simple. In fact, the requirements reflect what many employers have been doing for years. You may find that you

already largely comply with many of the provisions and will simply have to modify your existing programs somewhat. If you are operating in an OSHA-approved State Plan State, you must comply with the State's requirements, which may be different than those of the Federal rule. Many of the State Plan States had hazard communication or "right-to-know" laws prior to promulgation of the federal rule. Employers in State Plan States should contact their State OSHA Offices for more information regarding applicable requirements. (See the list of contacts in "States with Approved Plans" at the back of this booklet.)

The HCS requires information to be prepared and transmitted regarding all hazardous chemicals. The HCS covers both physical hazards (such as flammability) and health hazards (such as irritation, lung damage, and cancer.) Most chemicals used in the workplace have some hazard potential, and thus will be covered by the rule.

One difference between this rule and many others adopted by OSHA is that this one is performance-oriented. That means you have the flexibility to adapt the rule to the needs of your workplace, rather than having to follow specific rigid requirements. It also means that you have to exercise more judgment to implement an appropriate and effective program.

The standard's design is simple. Chemical manufacturers and importers must evaluate the hazards of the chemicals they produce or import. Using that information, they must then prepare labels for containers and more detailed technical bulletins called material safety data sheets (MSDSs).

Chemical manufacturers, importers, and distributors of hazardous chemicals are all required to provide the appropriate labels and material safety data sheets to the employers to whom they ship the chemicals. The information must be provided automatically. Every container of hazardous chemicals you receive must be labeled, tagged, or marked with the required information. Your suppliers also must send you a properly completed MSDS at the time of the first shipment of the chemicals, and with the next shipment after the MSDS is updated with new and significant information about the hazards.

You can rely on the information received from your suppliers. You have no independent duty to analyze the chemical or evaluate the hazards of it.

Employers that "use" hazardous chemicals must have a program to ensure the information is provided to exposed employees. "Use" means to package, handle, react, or transfer. This is an intentionally broad scope, and includes any situation where a chemical is present in such a way that employees may be exposed under normal conditions of use or in a foreseeable emergency.

The requirements of the rule that deal specifically with the hazard communication program are found in the standard in paragraphs (e), written hazard communication programs; (f), labels and other forms of warning; (g), material safety data sheets; and (h), employee information and training. The requirements of these paragraphs should be the focus of your attention. Concentrate on becoming familiar with them, using paragraphs (b), scope and application, and (c), definitions, as references when needed to help explain the provisions.

There are two types of work operations where coverage of the rule is limited. These are laboratories

and operations where chemicals are only handled in sealed containers (e.g., a warehouse). The limited provisions for these workplaces can be found in paragraph (b), scope and application. Basically, employers having these types of work operations need only keep labels on containers as they are received, maintain material safety data sheets that are received and give employees access to them, and provide information and training for employees. Employers do not have to have written hazard communication programs and lists of chemicals for these types of operations.

The limited coverage of laboratories and sealed container operations addresses the obligation of an employer to the workers in the operations involved, and does not affect the employer's duties as a distributor of chemicals. For example, a distributor may have warehouse operations where employees would be protected under the limited sealed container provisions. In this situation, requirements for obtaining and maintaining MSDSs are limited to providing access to those received with containers while the substance is in the workplace, and requesting MSDSs when employees request access for those not received with the containers. However, as a distributor of hazardous chemicals, that employer will still have responsibility for providing MSDSs to downstream customers at the time of the first shipment and when the MSDS is updated. Therefore, although they may not be required for the employees in the work operation, the distributor may, nevertheless, have to have MSDSs to satisfy other requirements of the rule.

Identifying Responsible Staff

Hazard communication will be a continuing program in your facility. Compliance with HCS is not a "one shot deal." In order to have a successful program, you must assign responsibility for both the initial and ongoing activities that have to be undertaken to comply with the rule. In some cases, these activities may be part of current job assignments. For example, Site Supervisors are frequently responsible for on-the-job training sessions. Early identification of the responsible employees and their involvement in developing your action plan will result in a more effective program design. Involving affected employees also will enhance the evaluation of the effectiveness of your program.

For any safety and health program, success depends on commitment at every level of the organization. This is particularly true for hazard communication, where success requires a change in behavior. This will occur only if employers understand the program and are committed to its success, and if the people presenting the information motivate employees.

Identifying Hazardous Chemicals in the Workplace

The standard requires a list of hazardous chemicals in the workplace as part of the written hazard communication program. The list will eventually serve as an inventory of everything for which you must maintain an MSDS. At this point, however, preparing the list will help you complete the rest of the program since it will give you some idea of the scope of the program required for compliance in your facility.

The best way to prepare a comprehensive list is to survey the workplace. Purchasing records also may help, and certainly employers should establish procedures to ensure that in the future

purchasing procedures result in MSDSs being received before using a material in the workplace.

The broadest possible perspective should be taken when doing the survey. Sometimes people think of "chemicals" as being only liquids in containers. The HCS covers chemicals in all physical forms -- liquids, solids, gases, vapors, fumes, and mists -- whether they are "contained" or not. The hazardous nature of the chemical and the potential for exposure are the factors that determine whether a chemical is covered. If it's not hazardous, it's not covered. If there is no potential for exposure, (e.g., the chemical is inextricably bound and cannot be released), the rule does not cover the chemical.

Look around. Identify the chemicals in containers, including pipes, but also think about chemicals generated in the work operations. For example, welding fumes, dusts, and exhaust fumes are all sources of chemical exposures. Read labels provided by the suppliers on hazard information. Make a list of all chemicals in the workplace that are potentially hazardous. For your own information and planning, you also may want to note on the list the location(s) of the products within the workplace, and an indication of the hazards as found on the label. This will help you as you prepare the rest of your program.

Paragraph (b), scope and application, includes exemptions for various chemicals or workplace situations. After compiling the complete list of chemicals, you should review paragraph (b) to determine if any of the items can be eliminated from the list because they are exempted materials. For example, food, drugs, and cosmetics brought into the workplace for employee consumption are exempt; rubbing alcohol in the first aid kit would not be covered.

Once you have compiled as complete a list as possible of the potentially hazardous chemicals in the workplace, the next step is to determine if you have received material safety data sheets for all of them. Check your files against the inventory you have just compiled. If any are missing, contact your supplier and request one. It is a good idea to document these requests, either by copy of a letter or a note regarding telephone conversations. If you have MSDSs for chemicals that are not on your list, figure out why. Maybe you don't use the chemical anymore. Or maybe you missed it in your survey. Some suppliers do provide MSDSs for products that are not hazardous. These do not have to be maintained by you. If you have questions regarding the hazard status of a chemical, contact the manufacturer, distributor, or importer.

You should not allow employees to use any chemicals for which you have not received an MSDS.

The MSDS provides information you need to ensure you have implemented proper protective measures for exposure.

Preparing and Implementing a Hazard Communication Program

The HCS requires all workplaces where employees are exposed to hazardous chemicals to have a written plan that describes how that facility will implement the standard. Preparation of the plan is not just a paper exercise -- all of the elements must be implemented in the workplace to comply

with the rule. See paragraph (e) of the standard for the specific requirements regarding written hazard communication programs. The only work operations that do not have to comply with the written plan requirements are laboratories and work operations where employees only handle chemicals in sealed containers. See paragraph (b), scope and application, for the specific requirements for these two types of workplaces.

The plan does not have to be lengthy or complicated. It is intended to be a blueprint for implementing your program -- an assurance that all aspects of the requirements have been addressed.

Many trade associations and other professional groups have provided sample programs and other assistance materials to affect employers. These have been very helpful to many employers since they tend to be tailored to the particular industry involved. You may wish to investigate whether your industry trade groups have developed such materials.

Although such general guidance may be helpful, you must remember that the written program has to reflect what you are doing in your workplace. Therefore, if you use a generic program, you must adapt it to address the facility it covers.

For example, the written plan must list the chemicals present at the site and indicate where written materials will be made available to employees. It also may indicate who is responsible for the various aspects of the program in your facility.

If OSHA inspects your workplace for compliance with the HCS, the OSHA compliance officer will ask to see your written plan at the outset of the inspection. In general, the following items will be considered in evaluating your program.

The written program must describe how the requirements for labels and other forms of warning, materials safety data sheets, and employee information and training, are going to be met in your facility. The following discussion provides the type of information compliance officers will be looking for to decide whether you have properly addressed these elements of the hazard communication program.

Labels and Other Forms of Warning

In-plant containers of hazardous chemicals must be labeled, tagged, or marked with the identity of the material and appropriate hazard warnings. Chemical manufacturers, importers, and distributors must ensure that every container of hazardous chemicals they ship is appropriately labeled with such information and with the name and address of the producer or other responsible party. Employers purchasing chemicals can rely on the labels provided by their suppliers. If the material is subsequently transferred by the employer from a labeled container to another container, the employer will have to label that container, unless it is subject to the portable container exemption.

See paragraph (f) for specific labeling requirements.

The primary information to be obtained from an OSHA-required label is the identity for the material and appropriate hazard warnings. The identity is any term which appears on the label, the MSDS, and the list of chemicals, and thus links these three sources of information. The identity used by the supplier may be a common or trade name ("Black Magic Formula"), or a chemical name (1, 1, 1 trichloroethane). The hazard warning is a brief statement of the hazardous effects of the chemical ("flammable," "causes lung damage"). Labels frequently contain other information, such as precautionary measures ("do not use near open flame") but this information is provided voluntarily and is not required by the rule. Labels must be legible and prominently displayed. There are no specific requirements for size or color or any specified test.

With these requirements in mind, the compliance officer will be looking for the following types of information to ensure that labeling is properly implemented in your facility:

- Designation of person(s) responsible for ensuring labeling of in-plant containers;
- Designation of person(s) responsible for ensuring labeling of any shipped container;
- Description of labeling system(s) used;
- Description of written alternatives to labeling of in-plant containers (if used); and,
- Procedures to review and update label information when necessary.

Employers that are purchasing and using hazardous chemicals -- rather than producing or distributing them -- will primarily be concerned with ensuring that every purchased container is labeled. If materials are transferred into other containers, the employer must ensure that these are labeled as well, unless they fall under the portable container exemption (paragraph f(7)). In terms of labeling systems, you can choose to use the labels provided by your suppliers on the containers. These will generally be verbal text labels, and do not usually include numerical rating systems or symbols that require special training. The most important thing to remember is that this is a continuing duty -- all in-plant containers of hazardous chemicals must always be labeled. Therefore, it is important to designate someone to be responsible for ensuring that the labels are maintained as required on the containers in your facility and that newly purchased materials are checked for labels prior to use.

Material Safety Data Sheets

Chemical manufacturers and importers are required to obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Distributors are responsible for ensuring that their customers are provided a copy of these MSDSs. Employers must have an MSDS for each hazardous chemical which they use. Employers may rely on the information received from their suppliers. The specific requirements for material safety data sheets are in paragraph (g) of the standard.

There is no specific format for the MSDS under the rule, although there are specific information

requirements. OSHA has developed a non-mandatory format, OSHA Form 174, which may be used by chemical manufacturers and importers to comply with the rule. The MSDS must be in English. You are entitled to receive from your supplier a data sheet which includes all of the information required under the rule. If you do not receive one automatically, you should request one. If you receive one that is obviously inadequate, with, for example, blank spaces that are not completed, you should request an appropriately completed one. If your request for a data sheet or for a corrected data sheet does not produce the information needed, you should contact your local OSHA Area Office for assistance in obtaining the MSDS.

Under the rule, the role of MSDSs is to provide detailed information on each hazardous chemical, including its potential hazardous effects, its physical and chemical characteristics, and recommendations for appropriate protective measures. This information should be useful to you as the employer responsible for designing protective programs, as well as to the workers. If you are not familiar with material safety data sheets and with chemical terminology, you may need to learn to use them yourself. A glossary of MSDS terms may be helpful in this regard. Generally speaking, most employers using hazardous chemicals will primarily be concerned with MSDS information regarding hazardous effects and recommended protective measures. Focus on the sections of the MSDS that are applicable to your situation.

MSDSs must be readily accessible to employees when they are in their work areas during their work shifts. This may be accomplished in many different ways. You must decide what is appropriate for your particular workplace. Some employers keep the MSDSs in a binder in a central location (e.g., in the pickup truck on a construction site.) Others, particularly in workplaces with large numbers of chemicals, computerize the information and provide access through terminals. As long as employees can get the information when they need it, any approach may be used. The employees must have access to the MSDSs themselves -- simply having a system where the information can be read to them over the phone is permitted only under the mobile worksite provision, paragraph (g) (9), when employees must travel between workplaces during the shift. In this situation, they have access to the MSDSs prior to leaving the primary worksite, and when they return, so the telephone system is simply an emergency arrangement.

In order to ensure that you have a current MSDS for each chemical in the plant as required, and that you provide employee access, the compliance officers will be looking for the following types of information in your written program:

- Designation of person(s) responsible for obtaining and maintaining the MSDSs;
- How such sheets are to be maintained in the workplace (e.g., in notebooks in the work area(s) or in a computer with terminal access), and how employees can obtain access to them when they are in their work area during the work shift;
- Procedures to follow when the MSDS is not received at the time of the first shipment;
- For producers, procedures to update the MSDS when new and significant health information is found; and,
- Description of alternatives to actual data sheets in the workplace, if used.

For employers using hazardous chemicals, the most important aspect of the written program in terms of MSDSs is to ensure that someone is responsible for obtaining and maintaining the MSDSs

for every hazardous chemical in the workplace. The list of hazardous chemicals required to be maintained as part of the written program will serve as an inventory. As new chemicals are purchased, the list should be updated. Many companies have found it convenient to include on their purchase order the name and address of the person designated in their company to receive MSDSs.

Employee Information and Training

Each employee who may be "exposed" to hazardous chemicals when working must be provided information and be trained prior to initial assignment to work with a hazardous chemical, and whenever the hazard changes. "Exposure" or "exposed" under the rule means that an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact, or absorption) and includes potential (e.g., accidental or possible) exposure. See paragraph (h) of the standard for specific requirements. Information and training may be done either by individual chemical, or by categories of hazards (such as flammability or carcinogenicity). If there are only a few chemicals in the workplace, then you may want to discuss each one individually. Where there are a large number of chemicals, or the chemicals change frequently, you will probably want to train generally based on the hazard categories (e.g., flammable liquids, corrosive materials, carcinogens). Employees will have access to the substance-specific information on the labels and MSDSs. Employers must ensure, however, that employees are made aware of which hazard category a chemical falls within.

Information and training are a critical part of the hazard communication program. Workers obtain information regarding hazards and protective measures through written labels and material safety data sheets. It is through effective information and training, however, that workers will learn to read and understand such information, determine how to acquire and use it in their own workplace, and understand the risks of exposure to the chemical in their workplaces as well as the ways to protect themselves. A properly conducted training program will ensure comprehension and understanding. It is not sufficient to either just read material to the workers or simply hand them material to read. You want to create a climate where workers feel free to ask questions. This will help you to ensure that the information is understood. You must always remember that the underlying purpose of the HCS is to reduce the incidence of chemical source illnesses and injuries. This will be accomplished by modifying behavior through the provision of hazard information and information about protective measures. If your program works, you and your workers will better understand the chemical hazards within the workplace. The procedures you establish, regarding, for example, purchasing, storage, and handling of these chemicals will improve, and thereby reduce the risks posed to employees exposed to the chemical hazards involved. Furthermore, your workers' comprehension also will be increased, and proper work practices will be followed in your workplace.

If you are going to do the training yourself, you will have to understand the material and be prepared to motivate the workers to learn. This is not always an easy task, but the benefits are worth the effort. More information regarding appropriate training can be found in *Training Requirements in OSHA Standards and Training Guidelines (OSHA 2254)*, which contains voluntary training guidelines prepared by OSHA's Training Institute. A copy of this document is available from the

Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, PA 15250-7954; (202) 512-1800.

When reviewing your written program regarding information and training, consider the following items:

- Designation of person(s) responsible for conducting training;
- Format of the program used (audiovisuals, class room instruction);
- Elements of the training programs (should be consistent with the elements in paragraph (h) of the HCS); and,
- Procedure to train new employees at the time of their initial assignment to work with a hazardous chemical, and to train employees when introducing a new hazard into the workplace.

The written program should provide enough details about the employer's plans in this area to assess whether or not a good faith effort is being made to train employees. OSHA does not expect that every workers will be able to recite all the information about each chemical in the workplace. In general, the most important aspects of training under the HCS are to ensure that employees are aware that they are exposed to hazardous chemicals, that they know how to read and use labels and material safety data sheets, and that, as a consequence of learning this information, they are following the appropriate protective measures established by the employer. OSHA compliance officers will be talking to employees to determine if they have received training, if they know they are exposed to hazardous chemicals, and if they know where to obtain substance specific information on labels and MSDSs.

The rule does not require employers to maintain records of employee training, but many employers choose to do so. This may help you monitor your own program to ensure that you have trained all employees appropriately. If you already have a training program, you may simply have to supplement it with whatever additional information is required under the HCS. For example, construction employers that are already in compliance with the construction training standard (29 CFR 1926.21) will have little extra training to do.

An employer can provide employees information and training through whatever means found appropriate and protective. Although there would always have to be some training on site (such as informing employees of the location and availability of the written program and MSDSs), employee training may be satisfied in part by general training about the requirements of the HCS which is provided by, for example, trade associations, unions, colleges, and professional schools. In addition, previous training, education, and experience of a worker may relieve the employer of some of the burdens of information and training that worker. Regardless of the method relied upon, however, the employer is always ultimately responsible for ensuring that employees are adequately trained. If the compliance officer finds that the training is deficient, the employer will be cited for the deficiency regardless of who actually provided the training on behalf of the employer.

In addition to these specific items, compliance officers also will be asking the following questions in assessing the adequacy of the program:

- Does a list of the hazardous chemicals exist in each work area or at a central location?

- Are methods the employer will use to inform employees of the hazards of non-routine tasks outlined?
- Are employees informed of the hazards associated with chemicals contained in unlabeled pipes in their work areas?
- On multi-employer worksites, has the employer provided other employers with information about labeling systems and precautionary measures where the other employers have employees exposed to the initial employer's chemicals?
- Is the written program made available to employees and their designated representatives?

If your program adequately addresses the means of communicating information to employees in your workplace and provides answers to the basic questions outlined above, it will comply with the rule.

Checklist for Compliance

The following checklist will help to ensure you comply with the rule:

- Obtained a copy of the rule.
 - Read and understood the requirements.
 - Assigned responsibility for tasks.
 - Prepared an inventory of chemicals.
 - Ensured containers are labeled.
 - Obtained MSDS for each chemical.
 - Prepared written program.
 - Made MSDSs available to workers.
 - Conducted training of workers.
 - Established procedures to maintain current program.
 - Established procedures to evaluate effectiveness.
-

Further Assistance

If you have a question regarding compliance with HCS, you should contact your local OSHA Area Office for assistance. In addition, each OSHA Regional Office has a Hazard Communication Coordinator who can answer your questions. Free consultation services also are available to assist employers, and information regarding these services can be obtained through the OSHA Area and Regional Offices as well (see lists at the end of this booklet).

Other Sources of OSHA Assistance

Safety and Health Program Management

Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. To assist employers and employees in developing effective safety and health programs, OSHA published recommended *Safety and Health Program Management Guidelines (Federal Register 54(18):3908-3916, January 26, 1989)*. These voluntary guidelines apply to all places of employment covered by OSHA.

The guidelines identify four general elements that are critical to the development of a successful safety and health management program:

- management commitment and employee involvement;
- worksite analysis;
- hazard prevention and control; and
- safety and health training.

The guidelines recommend specific actions under each of these general elements to achieve an effective safety and health program. A single, free copy of the guidelines can be obtained from the U.S. Department of Labor, OSHA Publications, P.O. Box 37535, Washington, DC 20013-7535, by sending a self-addressed mailing label with your request.

State Programs

The Occupational Safety and Health Act of 1970 encourages states to develop and operate their own job safety and health plans. States with plans approved under section 18(b) of the OSH Act must adopt standards and enforce requirements that are at least as effective as federal requirements. There are currently 25 state plan states: 23 of these states administer plans covering both private and public (state and local public government) employees; the other two states, Connecticut and New York, cover public employees only. Plan states must adopt standards comparable to federal requirements within six months of a federal standard's promulgation. Until such time as a state standard is promulgated, Federal OSHA provides interim enforcement assistance, as appropriate, in these states. A listing of approved state plans appear at the end of this publication.

Consultation Services

Consultation assistance is available on request to employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. Primarily developed for smaller employers with more hazardous operations, the consultation service is delivered by state government agencies or universities employing professional safety consultants and health consultants. Comprehensive assistance includes an appraisal of all work practices and environmental hazards of the workplace and all aspects of the employer's present job safety and health program.

The program is separate from OSHA's inspection efforts. No penalties are proposed or citations

issued for any safety or health problems identified by the consultant. The service is confidential.

For more information concerning consultation assistance, see the list of consultation projects at the end of this publication.

Training and Education

OSHA Area Offices offer a variety of information services, such as publications, audiovisual aids, technical advice, and speakers for special engagements. The OSHA Training Institute in Des Plaines,

Other Sources of OSHA Assistance

IL, provides basic and advanced courses in safety and health for federal and state compliance officers, state consultants, federal agency personnel, and private sector employers, employees, and their representatives.

OSHA also provides funds to nonprofit organizations, through grants to conduct workplace training and education in subjects where OSHA believes there is a lack of workplace training. Grants are awarded annually and grant recipients are expected to contribute 20 percent of the total grant cost.

For more information on grants, training, and education, contact the OSHA Training Institute, Office of Training and Education, 1555 Times Drive, Des Plaines, IL 60018, (847) 297-4810; (847) 297-4874 fax.

emergencies

For life-threatening situations, call (800) 321-OSHA. Complaints will go immediately to the nearest OSHA area or state office for help.

For further information on any OSHA program, contact your nearest OSHA area or regional office listed at the end of this publication.

OSHA Consultation Project Directory

State	Telephone
Massachusetts	(617) 727-3982
New Hampshire	(603) 271-2024
Rhode Island	(401) 222-2438
Vermont	(802) 828-2765

OSHA Area Offices

Area	Telephone
Bangor, ME	(207) 941-8179
Braintree, MA	(617) 565-6924

Concord, NH.....	(603) 225-1629
Methuen, MA	(617) 565-8110
Portland, ME.....	(207) 780-3178
Providence, RI	(401) 528-4663
Springfield, MA	(413) 785-0123

Seal-Tight Caulking & Masonry Restoration *Job Checklist*

Project manager and job foremen to review this list prior to start up of job.

1. Communication system, (phone or radio).
2. Water, (including drinking water) and sanitary facilities for number of employees. Arrangements for security of job site, (fencing, lights etc.).
3. Electrical ground fault protection or assured grounding program. Clean-up and waste disposal schedule. Perimeter survey of existing conditions, (utilities, streets, structures).
4. Traffic: Safe access, stairs, ladders, traffic pattern, sidewalk bridge; protection for abutters and general public; allowance for setting up double gates. Contact insurance carrier regarding loss prevention and claims. Contact local fire, police and public utility representatives.
5. Appoint safety coordinator.
6. Contractor's safety program and rules adapted to job site; communicated to subcontractors.
7. First aid supplies checked at least weekly.
8. Fire extinguishers or water equivalent. Fire/emergency evacuation plans.
9. Arrange for emergency medical services, (ambulance, hospital, doctor).
10. OSHA Standards, Bulletin Board, AGC package for bulletin board, i.e., required posters, (Workers Compensation Notice, EEO, Minimum Wage, Unemployment poster etc.).
11. Emergency phone numbers. OSHA 200's during February. Copy of electrical ground fault protection or assured grounding program, if in use.
12. Required maintenance records for equipment, (cranes material hoists etc.). Required approvals, (deep trenches, high scaffolds, demo surveys, shoring, dig-safe notification). Proof of training and safety instructions, (lasers, power actuated tools, first aid, propane etc.). Written respiratory protection programs if respirators are in use.

13. Warning signs i.e., *Hard Hat Area, Asbestos, No Trespassing, Danger, Caution*, etc.
14. Required special permits, (burning, welding, traffic etc.).
15. Accident and treatment report forms. Safety meetings i.e., *Tool Box Talks*. “Guide to an OSHA Inspection” (AGC/Mass. Safety Bulletin #2-79). Crime Prevention program, incident report forms.
16. Hard hats to be work on all construction projects involving overhead work.
17. Safety glasses.
18. Respirators.
19. Ear Plugs.
20. Guarding material for perimeter, scaffolds and floor holes.
21. Safety cans for flammable liquids.
22. Safety belts, lifeline, lanyards or nets and excavation shoring materials.
23. Personal protective equipment for visitors. Atmospheric testers, (carbon monoxide, oxygen, combustible gases, as special conditions warrant).
24. Flasher, signals, barricades, reflective clothing for traffic control.

Office Safety

Accidents occur in offices with a substantial degree of regularity. Office workers should be aware of hazards that they must guard against and of safe job procedures that they must use. Office supervisors must understand the nature of office hazards and take necessary preventative action.

Types of office accidents include:

1. Slips and Falls - Running and/or slipping on spilled fluids, highly polished floors or loose carpeting; tripping over wires; running into desk and cabinet drawers which have been left pulled out; falling from chairs and on stairs, etc.
2. Strains from Overexertion - Moving objects, (lifting, pushing, pulling etc.), sudden or awkward movements.

Office workers must know the location and general use of fire fighting equipment and first aid equipment and how to call for emergency assistance, fire, medical and police. Office staff should ensure use of only properly functioning office equipment, beware of frayed electrical cords, etc.

EMPLOYER’S FIRST REPORT OF INJURY OR FATALITY

- 1. WHEN TO FILE: File this form within 7 calendar days, not including Sundays and legal holidays, of receipt of notice of any injury alleged to have arisen out of and in the course of employment, which totally or partially incapacitates an employee for a period of 5 or more calendar days from earning wages. This form is not an admission of liability, but must be filed even though the Employer may believe that the Employee is not injured, or that the Employee is not entitled to benefits under M.G.L. Chapter 152.

THIS FORM MUST BE FILED BY THE EMPLOYER IN THE EVENT OF AN INJURY THAT RESULTS IN DEATH OR

EMPLOYERS FIRST REPORT OF INJURY OR FATALITY

***UNS - UNSPECIFIED **NEC - NOT ELSEWHERE CLASSIFIED**

**Department of Industrial Accidents – Department 101 600 Washington Street – 7th Floor, Boston,
Massachusetts 02111 Info. Line 800-323-3249 ext. 470 in Mass. Outside Mass. - 617-727-4900 ext. 470 <http://www.mass.gov/dia>**

Other 265 Carpal Tunnel Syndrome 510 Cardiovascular and Other Conditions of the Circulatory System 520 Complications Peculiar to Medical Care 500 Effects of

513 Knee(s) 515 Lower Leg(s) 518 Leg(s), Multiple 519 Leg(s), NEC** 520 Ankle(s) 530 Foot or Feet, Not Ankle 540 Toe(s) 598 Lower Extremities, Multiple 700 MULTIPLE PARTS Applies when more than one major body part is affected by the injury or devise.

THIS FORM DOES NOT CONSTITUTE AN EMPLOYEE’S CLAIM FOR BENEFITS UNDER WORKERS’ COMPENSATION.

Small Business Handbook

Small Business Safety and Health Management Series

OSHA 2209-02R 2005

Employers are responsible for providing a safe and healthful workplace for their employees. OSHA's role is to assure the safety and health of America's workers by setting and enforcing standards; providing training, outreach and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.

About this Handbook

This handbook is provided to owners, proprietors and managers of small businesses by the Occupational Safety and Health Administration (OSHA), an agency of the U.S. Department of Labor. For additional copies of this publication, write to the U.S. Government Printing Office, (GPO), Superintendent of Documents, Mail Stop SDE, 732 N. Capitol Street, NW, Washington, DC 20401, or call the OSHA Publications Office at (202) 693-1888, or fax (202) 693-2498 for ordering information. Please note that the entire text of the Small Business Handbook is available on OSHA's website [[PDF](#) - 260 KB].

The handbook should help small business employers meet the legal requirements imposed by the Occupational Safety and Health Act of 1970 (the Act), and achieve an in-compliance status before an OSHA inspection. An excellent resource to accompany this information is OSHA's Safety and Health Program Management Guidelines, (54 Federal Register 3904-3916, January 26, 1989), also available on OSHA's website.

This handbook is not a legal interpretation of the provisions of the Act and does not place any additional requirements on employers or employees. Employers cannot be cited under the General Duty Clause in Section 5(a)(1) of the Act for failure to follow recommendations in this handbook.

The materials in this handbook are based upon Federal OSHA standards and other requirements in effect at the time of publication and upon generally accepted principles and activities within the job safety and health field. They should be useful to small business owners or managers and can be adapted easily to individual establishments.

It is important to point out that 24 states, Puerto Rico and the Virgin Islands operate their own OSHA-approved safety and health programs under Section 18 of the Act. While the programs in these State Plan States may differ in some respects from Federal OSHA, this handbook can be used by employers in any state because the standards imposed by State Plan States must be at least as effective as Federal OSHA standards. A list of states that operate their own safety and health programs can be found on [OSHA's website](#).

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PREFACE

American employers and workers want safe and healthful places in which to work. They want everyone on the job to go home whole and healthy each day. Determined to make that dream possible, OSHA is committed to assuring - so far as possible - that every working man and woman in the nation has safe and healthful working conditions. OSHA believes that providing workers with a safe workplace is central to their ability to enjoy health, security and the opportunity to achieve the American dream.

OSHA seeks to cut unnecessary rules, regulations and red tape. It is eliminating thousands of pages of outdated regulations and continues to rewrite standards in plain English. OSHA is paring down its regulatory agenda so that it more accurately reflects realistic goals that best serve the needs of American employers and employees.

Confronted by the realities and demands to keep pace with the workforce and problems of the future, OSHA is developing new strategies to reduce occupational fatalities, injuries and illnesses. Coupled with strong, effective and fair enforcement, OSHA strives to provide improved outreach, education and compliance assistance to America's employers and employees.

Office of Small Business Assistance

OSHA wants to provide quality service to our small business customers. In October 2002, OSHA created the Office of Small Business Assistance to provide small business direction, to facilitate information sharing and to help in finding and achieving regulatory compliance. The office also works to educate small businesses on using up-to-date tools and materials, and facilitates opportunities to comment on OSHA's regulatory agenda. The Office of Small Business Assistance maintains OSHA's specialized small business web pages found on [OSHA's website](#).

The Office of Small Business Assistance can be contacted by telephone at (202) 693-2220 or by writing to: Director, Office of Small Business Assistance, 200 Constitution Avenue, N.W., Room N-3700, Washington, DC 20210.

Cooperative Programs

Years of experience show us that voluntary collaborative relationships between OSHA, the private sector and other government entities lead to improved safety and health. As a result, OSHA continues to expand its cooperative programs which currently include the free and confidential Consultation Program, the Voluntary Protection Programs, the Strategic Partnership Program and OSHA's newest addition, Alliances. For a more detailed description of each of these programs, please see pages 40- 42.

Small businesses are encouraged to investigate the full array of cooperative programs offered by OSHA. Participation can be on an individual company basis or through an industry association. Detailed information on each program is also available on [OSHA's website](#), by contacting any

OSHA office, or by calling (800) 321-OSHA.

State Plans

OSHA has important partnerships with the 24 states, Puerto Rico and the Virgin Islands that operate their own OSHA-approved safety and health programs. State workplace safety and health programs frequently lead the way in developing innovative approaches to making America's workplaces safer and healthier.

States that operate their own worker safety and health plans must provide worker protection that is "at least as effective as" the Federal program. However, because their standards and other procedures may vary, businesses should become familiar with their state regulations and agencies. See OSHA's website for a list of State Plan States.

Office of Training and Education

OSHA's Office of Training and Education provides training and instruction in all facets of occupational safety and health. OSHA's Training Institute, located in Arlington Heights, IL, provides training for OSHA compliance safety and health officers as well as for the general public and safety and health staff from other Federal agencies. In addition to OSHA's Training Institute, there are 32 additional education sites located throughout the country. These OSHA education centers operate in conjunction with universities, colleges and learning centers to conduct OSHA courses for the private sector and other Federal agencies, making safety and health training and education more accessible to those who need it. There are tuition fees for private sector students. For more information about OSHA's Training Institute, OSHA's education centers, or to obtain training catalogs with course schedules, write the OSHA Training Institute, 2020 South Arlington Heights Road, Arlington Heights, IL 60005 or call (847) 297-4810. The information is also fully accessible on the Internet at [OSHA's website](#).

OSHA's Website

OSHA has made every effort to continuously expand and improve its website. OSHA's extensive website provides employers and employees with practical, easy-to-understand and up-to-date guidance on regulations, compliance assistance and learning how to identify and control hazards. Each OSHA cooperative program has individual web pages describing program elements and highlighting successes of the participants. Several pages are devoted to small business, technical links, news items, publication lists and an inventory of compliance assistance tools, including expert advisors and e-tools. E-tools are "stand-alone" interactive, web-based training tools on occupational safety and health topics. Regulations, standards, directives and interpretations relating to OSHA can be found as well. There is a Spanish version of the OSHA website, and many posters and some publications are also available in Spanish.

OSHA's web pages include MyOSHA, which allows users to create their own personalized OSHA web page with customized content and links. Quick Start is another tool on OSHA's Compliance Assistance web page that allows the user to identify many of the major OSHA requirements and guidance materials that apply to their individual workplaces or industry sectors.

Through its website, OSHA invites citizens to email questions that can be routed to appropriate agency officials for response. Any communication conducted via the "Contact Us" link on the OSHA website is considered an informational exchange rather than an official communication with the Department of Labor. For an official response to a question or concern, inquiries should be submitted in writing.

If you would like to receive regular updates from OSHA about new programs, tools, best practices and other useful information, subscribe to the agency's e-news memo, QuickTakes. QuickTakes is issued twice monthly to subscribers and is always available online. You can subscribe to OSHA's QuickTakes at [OSHA's website](#).

Safety and Health Add Value

Addressing safety and health issues in the workplace saves the employer money and adds value to the business. Recent estimates place the business costs associated with occupational injuries at close to \$170 billion-expenditures that come straight out of company profits.

When workers stay whole and healthy, the direct cost-savings to businesses include:

- lower workers' compensation insurance costs;
- reduced medical expenditures;
- smaller expenditures for return-to-work programs;
- fewer faulty products;
- lower costs for job accommodations for
- injured workers;
- less money spent for overtime benefits.

Safety and health also make big reductions in indirect costs, due to:

- increased productivity;
- higher quality products;
- increased morale;
- better labor/management relations;
- reduced turnover;
- better use of human resources.

Employees and their families benefit from safety and health because:

- their incomes are protected;
- their family lives are not hindered by injury;
- their stress is not increased.

Simply put, protecting people on the job is in everyone's best interest-our economy, our communities, our fellow workers and our families. Safety and health add value to businesses, workplaces and lives.

INTRODUCTION: The Value of a Safety and Health Management System

A Profit and Loss Statement

As a small business owner, you are, by nature, a risk taker. You wager your business acumen against larger, perhaps more heavily financed corporate groups and other free-spirited, self-employed individuals like yourself. There is excitement and challenge in such a venture, but to succeed you need good management information, an ability to be a good manager of people and the intelligence and inner strength to make the right decisions.

Thousands of workers die each year and many, many more suffer injury or illness from conditions at work. But how often does an owner or manager like you actually see or even hear about work-related deaths, serious injuries or illnesses in the businesses with which you are familiar? How often has your business actually sustained this type of loss?

In most small businesses, the answer is rarely. For this reason, many owners or managers do not understand why there is controversy about the Occupational Safety and Health Administration (OSHA), job safety and health standards, inspections, citations, etc.

But others have learned why. Unfortunately, they have experienced a loss. These owner/managers will tell you that it is too late to do anything once a serious accident happens. They have learned that prevention is the only real way to avoid this loss.

Reducing losses is a goal that you as an owner or manager share with us in OSHA. While we may see this goal in a slightly different light, it remains a common bond.

We have learned from small employers, like you, that you place a high value on the well-being of your employees. Like many small businesses, you may employ family members and personal acquaintances. And, if you don't know your employees before they are hired, then chances are that the very size of your workplace will promote the closeness and concern for one another that small businesses value.

Assuming that you are committed to safe and healthful work practices, OSHA wants to work with you to prevent all losses. We believe that, when you make job safety and health a real part of your everyday operations, you will not lose in the long run. Investing in safety and health activity now will better enable you to avoid possible losses in the future.

Developing a Profitable Strategy for Handling Occupational Safety and Health

Nobody wants accidents to happen in his or her business. A serious fire, a permanent injury, or the death of an employee or owner can cause the loss of profit or even an entire business. To prevent such losses, you don't have to turn your business upside down. You may not have to spend a lot of

money, either. You do need to use good business sense and apply recognized prevention principles.

There are reasons why accidents happen. Something goes wrong somewhere. It may take some thought, and maybe the help of friends or other trained people, to figure out what went wrong, but an accident always has a cause-a reason why. Once you know why an accident happened, it is possible to prevent future incidents. You need some basic facts and perhaps some help from others who already know some of the answers. You also need a plan-a plan to prevent accidents.

Not all dangers at your worksite depend on an accident to cause harm, of course. Worker exposure to toxic chemicals or harmful levels of noise or radiation may happen in conjunction with routine work as well as by accident. You may not realize the extent of the exposure or harm that you and your employees face. The effect may not be immediate. You need a plan that includes prevention of these health hazard exposures and accidents. You need a safety and health management system.

It is not difficult to develop such a plan. Basically, your plan should address the types of accidents and health hazard exposures that could happen in your workplace. Because each workplace is different, your program should address your specific needs and requirements.

There are four basic elements to all good safety and health programs. These are as follows:

1. Management Commitment and Employee Involvement. The manager or management team leads the way, by setting policy, assigning and supporting responsibility, setting an example and involving employees.
2. Worksite Analysis. The worksite is continually analyzed to identify all existing and potential hazards.
3. Hazard Prevention and Control. Methods to prevent or control existing or potential hazards are put in place and maintained.
4. Training for Employees, Supervisors and Managers. Managers, supervisors and employees are trained to understand and deal with worksite hazards.

Regardless of the size of your business, you should use each of these elements to prevent workplace accidents and possible injuries and illnesses.

Developing a workplace program following these four points is a key step in protecting you and your workers' safety and health. If you already have a program, reviewing it in relation to these elements should help you improve what you have.

Following this four-point approach to safety and health in your business may also improve efficiency. It may help you reduce insurance claims and other costs. While having a safety and health plan based on these four elements does not guarantee compliance with OSHA standards, the approach will help you toward full compliance and beyond.

It will certainly give you a way to express and document your good faith and commitment to

protecting your workers' health and safety.

This approach usually does not involve large costs. Developing a health and safety protection plan does not have to be expensive and generally does not require additional employees, especially in smaller businesses. Safety and health can be integrated into your other business functions with modest effort on your part.

The key to the success of a safety and health plan is to see it as a part of your business operation and to see it reflected in your day-to-day operations. As you implement the plan and incorporate it into your business culture, safety and health awareness will become second nature to you and your employees.

The next section provides short descriptions and illustrations of each element. Since most employers, like you, are pressed for time, these descriptions will assist you in getting started on your own approach.

A FOUR-POINT WORKPLACE PROGRAM: The Basis of a Plan

The Four-Point Workplace Program described here is based upon the Safety and Health Program Management Guidelines issued by OSHA in January 1989. (For a free copy of the guidelines, go to [OSHA's website](#), write to OSHA Publications, U.S. Department of Labor, P.O. Box 37535, Washington, DC 200013-7535, or call (202) 693-1888.) Although voluntary, these guidelines represent OSHA's policy on what every worksite should have in place to protect workers from occupational hazards. The guidelines are based heavily on OSHA's experience with its Voluntary Protection Programs (VPP), which recognize excellence in workplace safety and health management. For more information on these guidelines and OSHA's cooperative programs, contact OSHA's Office of Small Business Assistance, U.S. Department of Labor, 200 Constitution Avenue, NW, Room N-3700, Washington, DC 20210, (202) 693-2220.

Using the Four-Point Program

As you review this publication, we encourage you to use the Action Plan Worksheet in Appendix A to jot down the things you want to do to make your workplace safe for your employees. Noting those actions as you go along will make it easier to assemble the total plan you need.

MANAGEMENT COMMITMENT AND EMPLOYEE INVOLVEMENT

As the owner or manager of a small business, your attitude toward job safety and health will be reflected by your employees. If you are not interested in preventing employee injury and illness, your employees will probably not give safety and health much thought either.

Therefore, it is essential that you demonstrate at all times your personal concern for employee safety and health, and the priority you place on them in your workplace. Your policy must be clear. Only you can show its importance through your own actions.

You can demonstrate the depth of your commitment by involving your employees in planning and

carrying out your efforts. If you seriously involve your employees in identifying and resolving safety and health problems, they will bring their unique insights and energy to achieving the goals and objectives of your program. The men and women who work for you are among the most valuable assets you have. Their safety, health and goodwill are essential to the success of your business. Having them cooperate with you in protecting their safety and health not only helps to keep them healthy-it makes your job easier.

Here are some actions to consider:

- Post your policy on worker safety and health next to the OSHA Workplace Poster where all employees can see it. (See Appendix B, Model Policy Statements.)
- Hold a meeting with all employees to communicate your safety and health policy, and discuss your objectives for safety and health.
- Make sure that your support is visible by getting personally involved in the activities that are part of your safety and health program. For example, personally review all inspection and accident reports and ensure that follow-up occurs when needed.
- Ensure that you, your managers and your supervisors follow all safety requirements that apply to all employees, even if you are only in an area briefly. If, for instance, you require a hard hat, safety glasses and/or safety shoes in an area, wear them yourself when you are in that area.
- Take advantage of your employees' specialized knowledge and encourage them to buy into the program by having them make inspections, conduct safety training, or investigate accidents.
- Make clear assignments of responsibility for every part of your safety and health program, and make sure everyone understands them. The more people who are involved, the better. A good rule of thumb is to assign safety and health responsibilities in the same way you assign production responsibilities. Make it a special part of everyone's job to work safely.
- Give those with safety and health responsibility enough people, time, training, money and authority to get the job done.
- Don't forget your safety and health program after you make assignments; make sure the job gets done. Recognize and reward those who do well and correct those who don't.
- At least once a year, review what you have accomplished in meeting your objectives and re-evaluate whether you need new objectives or program revisions.
- Institute an accountability system where all personnel will be held accountable for not following work rules designed to promote workplace safety and health.

WORKSITE ANALYSIS

It is your responsibility to know what items or processes that helps you make sure that you know what you need to keep your workers safe. For help in getting started with these processes, you can call on your state on-site Consultation Program and have an experienced health and safety

professional visit your workplace for free and confidentially. Locations for each state are listed on OSHA's website. Also, OSHA's booklet, Job Hazard Analysis, may be helpful. (See OSHA Publications at page 42 for ordering information.)

Here are some actions to consider:

- Request a consultation visit from your state on-site Consultation Program covering both safety and health to get a full survey of the hazards that exist in your workplace and those that could develop. You can also contract for such services from expert private consultants if you prefer.
- Establish a way to get professional advice when you make changes to procedures or equipment, to ensure that the changes are not introducing new hazards into your workplace. Find ways to keep current on newly recognized hazards in your industry.
- Periodically review with employees each job, analyzing it step-by-step to see if there are any hidden hazards in the equipment or procedures.
- Set up a self-inspection system to check your hazard controls and evaluate any new hazards. The checklists (at pages 18-39) provide a starting point. Your state consultant can assist you in establishing an effective system.
- Make sure your employees feel comfortable in alerting you or another member of management when they see things that look dangerous or out of place.
- Learn how to conduct a thorough investigation when things go wrong. This will help you develop ways to prevent recurrences. Extensive information can be found on OSHA's website under "Accident Investigation" in the index.
- Review several years of injury or illness records to identify patterns that can help you devise strategies to improve your safety and health program. Periodically review several months of experience to determine if any new patterns are developing.

HAZARD PREVENTION AND CONTROL

Once you have identified your existing and potential hazards, you are ready to implement the systems that prevent or control those hazards. Your state Consultation Program can help you do this. Whenever possible, hazards should be eliminated. Sometimes that can be done through substitution of a less toxic material or engineering controls. When you cannot eliminate hazards, systems should be established to control them.

Here are some actions to consider:

- Set up safe work procedures based on an analysis of the hazards in your workplace and ensure that employees understand and follow them. It is a good idea to involve employees in the analysis that results in those procedures. (See Appendix C, Codes of Safe Practices.)
- Be ready to enforce the rules for safe work procedures. Ask your employees to help you establish a disciplinary system that will be fair and understood by everyone.

- Where necessary, ensure that personal protective equipment (PPE) is used and that your employees know why they need it, how to use it and how to maintain it.
- Provide for regular equipment maintenance to prevent breakdowns that can create hazards. Ensure that preventive and regular maintenance are tracked to completion.
- Plan for emergencies, including fire and natural disasters. Conduct frequent drills to ensure that all employees know what to do under stressful conditions.
- Ask your state consultant to help develop a medical program that fits your worksite. Involve nearby doctors and emergency facilities by inviting them to visit your workplace and help you plan the best way to avoid injuries and illness during emergency situations.
- Ensure the ready availability of medical personnel for advice and consultation on matters of employee health. This does not mean that you must provide health care, but you must be prepared to deal with medical emergencies or health problems connected to your workplace

To fulfill the above requirements, consider the following:

- Develop an emergency medical procedure to handle injuries, transport ill or injured workers and notify medical facilities. Posting emergency numbers is a good idea.
- Survey the medical facilities near your place of business and make arrangements for them to handle routine and emergency cases. Cooperative agreements may be possible with nearby larger workplaces that have on-site medical personnel and/or facilities.
- Ensure that your procedure for reporting injuries and illnesses is understood by all employees.
- Perform routine walkthroughs of the worksite to identify hazards and to track identified hazards until they are corrected.
- If your business is remote from medical facilities, you are required to ensure that adequately trained personnel are available to render first aid. First aid supplies must be readily available for emergency use. Arrangements for this training can be made through your local Red Cross chapter, your insurance carrier, your local safety council, and others.
- Check battery charging stations, maintenance operations, laboratories, heating and ventilating operations and any corrosive materials areas to make sure the required eye-wash facilities and showers are operational.
- Consider retaining a local doctor or an occupational health nurse on a part-time or as-needed basis for advice on medical and first aid planning.

TRAINING FOR EMPLOYEES, SUPERVISORS AND MANAGERS

An effective accident prevention program requires proper job performance from everyone in the workplace.

As an owner or manager, you must ensure that all employees know about the materials and equipment they work with, known hazards and how to control the hazards.

Each employee needs to know that:

- no employee is expected to undertake a job until he or she has received job instructions on how to do it properly and is authorized to perform that job. Also,

- no employee should undertake a job that appears unsafe.

You may be able to combine safety and health training with other training, depending upon the types of hazards in your workplace.

Here are some actions to consider:

- Ask your state consultant to recommend training for your worksite. The consultant may be able to conduct training while he or she is there.
- Make sure you have trained your employees on every potential hazard that they could be exposed to and how to protect themselves. Then verify that they really understand what you taught them.
- Pay particular attention to your new employees and to employees who are moving to new jobs. Because they are learning new operations, they are more likely to get hurt.
- Train your supervisors to understand all the hazards faced by the employees and how to reinforce training with quick reminders and refreshers, or with disciplinary action if necessary.
- Make sure that your top management staff understand their safety and health responsibilities and how to hold subordinate supervisory employees accountable for theirs.

Documenting Your Activities

Document your activities in all elements of the Four-Point Workplace Program. Essential records, including those legally required for workers' compensation, insurance audits and government inspections must be maintained as long as the actual need exists or as required by law. Keeping records of your activities, such as policy statements, training sessions, safety and health meetings, information distributed to employees, and medical arrangements made, is greatly encouraged. Maintaining essential records also will demonstrate sound business management as supporting proof for credit applications, for showing "good faith" in reducing any proposed penalties from OSHA inspections, for insurance and other audits, and aid efficient review of your current safety and health activities for better control of your operations and to plan improvements.

Safety and Health Record keeping

Records of sales, costs, profits and losses are essential to all successful businesses. They enable the owner or manager to learn from experience and to make corrections for future operations. Records of accidents, related injuries, illnesses and property losses can serve the same purpose, if they are used in the same way. The primary purpose of OSHA-required record keeping is to retain information about accidents that have happened to help determine the causes and develop procedures to prevent a recurrence.

INJURY/ILLNESS RECORDS

OSHA rules for recording and reporting occupational injuries and illnesses affect 1.4 million establishments. Small businesses with 10 or fewer employees throughout the year are exempt from most of the requirements of the OSHA record keeping rules, as are a number of specific industries in the retail, service, finance, insurance and real estate sectors that are classified as low-hazard.

Detailed information about OSHA record keeping rules can be found at [OSHA's website](#) or refer to 29 Code of Federal Regulations (CFR) 1904 for the specific exceptions.

OSHA record keeping can help the small business employer evaluate the success of safety and health activities. Success can be measured by a reduction or elimination of employee injuries and illnesses during a calendar year.

The OSHA record keeping system has five steps:

1. Obtain a report on every injury or job-related illness requiring medical treatment (other than basic first aid).
2. Record each injury or job-related illness on OSHA Form 300 (Log of Work-Related Injuries and Illnesses) using the instructions provided.
3. Prepare a supplementary record of occupational injuries and illnesses for recordable cases on OSHA Form 301 (Injury and Illness Incident Report).
4. Every year, prepare an annual summary using OSHA Form 300A (Summary of Work-Related Injuries and Illnesses). Post it no later than February 1, and keep it posted until May 1. A good place to post it is next to the OSHA Workplace Poster.
5. Retain these records for at least five years. Periodically review these records to look for any patterns or repeat situations. These records can help you to identify high-risk areas that require your immediate attention.

Basic OSHA record keeping requirements address only injuries and illnesses, so you might consider expanding your own records to include all incidents, including those where no injury or illness resulted. This information may assist you in pinpointing unsafe conditions and/or procedures. Safety councils, insurance carriers and others can assist you in instituting such a system.

The employer is required to report to OSHA within eight hours of the accident, all work-related fatalities or multiple hospitalizations that involve three or more employees.

Even if your business is exempt from routine record keeping requirements, you may be selected by the Federal Bureau of Labor Statistics (BLS) or a related state agency for inclusion in an annual sample survey. You will receive a letter directly from the agency with instructions, if you are selected.

EXPOSURE RECORDS AND OTHERS

In addition to injury/illness records, certain OSHA standards require records on the exposure of employees to toxic substances and hazardous exposures, physical examination reports and

employment records.

As you identify hazards, you will be able to determine whether these requirements apply to your workplace. Your records should be used in conjunction with your control procedures and with your self-inspection activity. They should not be considered merely as bookkeeping.

STARTING A SAFETY AND HEALTH MANAGEMENT SYSTEM: Creating a Plan

You can use this handbook to create a basic plan of action for starting a safety and health management system at your business. The action plan described in this section provides the most direct route to getting yourself organized to complete the Four-Point Program outlined in the previous section.

Decide to Start Now

The time to start your safety and health management system is now. You have a better picture of what constitutes a good safety and health program. Now you can address the practical concerns of putting these elements together and coming up with a program to suit your workplace.

Hopefully, you have been taking notes for your action plan as you reviewed the preceding description of the Four-Point Program. You should now be ready to decide what you want to accomplish and to determine what steps are necessary to achieve your goals. Next you need to determine how and when each step will be done and who will do it.

Your plan should consider your company's immediate needs and provide for ongoing, long-lasting worker protection. Once your plan is designed, it is important to follow through and use it in the workplace. You will then have a program to anticipate, identify and eliminate conditions or practices that could result in injuries and illnesses.

If you have difficulty deciding where to begin, a phone call to your state Consultation Program will help get you started. A state consultant will survey your workplace for existing or potential hazards. Then, if you request it, he or she will determine what you need to make your safety and health program effective. The consultant will work with you to develop a plan for making these improvements and to keep your program effective.

Whether you choose to work with a consultant or to develop your program yourself, many publications are available from your state on-site Consultation Program or from OSHA that spell out in greater detail the steps you can take to create an effective safety and health program for your workplace. The rewards for your efforts will be an efficient and productive workplace with a low level of loss and injury.

Designating Responsibility

You must decide who in your company is the most appropriate person to manage your safety and

health system. Who can ensure that the program will become an integral part of your business? In many cases it will be you, the owner. Sometimes it will be a plant manager or key supervisor. It could even be an engineer, personnel specialist, or other staff member.

Whoever you choose should be committed to workplace safety and health, have the time to develop and manage the program, and be willing to take on the responsibility and accountability that goes with operating an effective program. The individual will need your full cooperation and support, but the ultimate responsibility for safety and health in your workplace rests on you.

Ask for Help

Federal occupational safety and health law allows a state to develop and operate its own occupational safety and health program in place of the Federal OSHA program. It is possible that the regulatory aspect of the law (setting of mandatory minimum standards and conducting inspections of workplaces) is being operated by your state government as opposed to Federal OSHA.

One of the first things to learn is which branch of government, Federal or state, has current jurisdiction over your business. If you are not sure what agency is responsible for administering workplace safety and health in your state, contact the nearest OSHA Area Office to find out. (See [OSHA's website](#). You will need certain Federal OSHA publications (or comparable state publications) for use in your safety and health activities, such as:

- OSHA Workplace Poster (Job Safety and Health Protection - OSHA 3165). You must display the Federal or state OSHA poster in your workplace. This poster is also available in Spanish (Job Safety and Health Protection OSHA-3167).
- OSHA standards that apply to your business. You need to have a copy of all OSHA standards that apply to your type of business available for reference. (See Appendix D.) Standards are the regulations that OSHA uses to inspect for compliance and should be the baseline for your inspections in determining what to do when hazards are identified. Most businesses fall under OSHA's General Industry Standards. If you are involved with construction or maritime operations, you will need the standards that apply to these classifications. (In states with state-run occupational safety and health programs, use the appropriate state standards.)
- Recordkeeping requirements and the necessary forms.
- Occupational Safety and Health Act of 1970. You may want a copy of this legislation for reference.

Organize the Workplace

Poor housekeeping can contribute to low morale and sloppy work. Most safety action programs start with an intensive cleanup campaign in all areas of the workplace.

Get rid of unnecessary items; provide proper waste containers; store flammables properly; make sure exits are not blocked; mark aisles and passageways; provide adequate lighting, etc.

Get everyone involved and impress upon employees that you want to make your workplace safer,

more healthful and more efficient.

Start Gathering Specific Facts About Your Situation

Before making changes in your safety and health operations, you should gather information about the current conditions and business practices that comprise your safety and health program. This information can help you identify problems and determine what is needed to solve them.

Your workplace assessment should be conducted by the person responsible for your safety and health management system and/or a professional safety and health consultant. The assessment consists of two major activities:

1. A comprehensive safety and health survey of your entire facility will identify any existing or potential safety and health hazards. This initial survey should focus on evaluating workplace conditions with respect to safety and health regulations and generally recognized safe and healthful work practices. It should include checking on the use of any hazardous materials, observing employee work habits and practices, and discussing safety and health problems with employees. See the Self-Inspection Checklists (at pages 18-39), to help you get a good start on creating this initial survey.

2. The second major activity is to assess your existing safety and health program and identify areas that work well and those that need improvement. You should gather as much information as you can that relates to safety and health management in your workplace. You should include the following in this review:

- Safety and health activities. Examine ongoing activities as well as those tried previously, company policy statements, rules (both work and safety), guidelines for proper work practices and procedures, and records of training programs.
- Equipment. List your major equipment, what it is used for and where it is located. Special attention should be given to inspection schedules, maintenance activities, and plant and office layouts.
- Employee capabilities. Make an alphabetical list of all employees, showing the date hired, their job descriptions, and experience and training.
- Accident and injury/illness history. Review first aid cases and workers' compensation insurance payments and awards, and review your losses. Compare your insurance rate with others in your group. Give special attention to recurring accidents, types of injuries, etc.

After gathering facts, see if any major problem areas emerge such as interruptions in your normal operations, too many employees taking too much time off due to illness or injury, too many damaged products, etc. General help with this kind of problem identification can often be obtained from compensation carriers, local safety councils, trade associations, state agencies, major suppliers or similarly situated businesses in the same industry.

If you discover a major problem, see what can be done to solve it. Once a problem is identified, you can work on the corrective action or a plan to control the problem. Take immediate action and make a record of what you have done. Even if you find no major problems, don't stop there. Now it is

time to develop a comprehensive safety and health program to avoid any major problems in the future.

Establish a Four-Point Safety and Health Program

The success of any workplace safety and health program depends on careful planning. This means that you must take the time to analyze what you want to accomplish and develop an action plan in order to attain your goals. From this standpoint, you can design a step-by-step process to take you from the idea stage to an effective safety and health management system.

The best way to create a safe and healthful workplace is to institute the Four-Point Program discussed at page 8 of this handbook.

Establish your management commitment and involve your employees. No safety and health program will work without this commitment and involvement. The first step is to designate a person to be responsible for your safety and health program.

Involve your employees as widely as possible from the beginning. They are most in contact with the potential and actual safety and health hazards at your worksite and will have constructive input on the development of your program. The ultimate success of your safety and health program will depend on their support.

Make sure your program assigns responsibility and accountability to all employees in your organization. A good safety and health program makes it clear that each and every employee, from you through the supervisory levels to the line worker, carries responsibility for his or her part of the program. Make safety and health duties clear and hold every individual accountable for his or her safety- and health-related duties.

Refer to the recommended actions to take in the Worksite Analysis paragraph at page 9. These will help start your program off on the right track. You will be building the foundation for a successful safety and health program.

Establish and regularly conduct a worksite analysis. A successful safety and health program depends on an accurate identification of all the hazards and potential hazards in your workplace. This is an ongoing process that includes routine self-inspections.

Create systems and procedures to prevent and control hazards identified through your worksite analysis. OSHA standards can be helpful because they address controls in order of effectiveness and preference. The hierarchy of controls is engineering, administrative, work practice and PPE. Whenever feasible, engineering, administrative or work practice controls should be instituted even if they do not eliminate the hazard or reduce exposure. Use of such controls in conjunction with PPE will help reduce the hazard or exposure to the lowest practical level. Where no standard exists,

creative problem-solving and consultant resources may help you create effective controls. The basic formula for controlling workplace hazards, in order of preference, includes:

- Eliminating the hazard from the machine, the method, the material or the facility.
- Abating the hazard by limiting exposure or controlling it at its source.
- Training personnel to be aware of the hazard and to follow safe work procedures to avoid it.
- Prescribing PPE for protecting employees against the hazard and ensuring that they not only use it, but that they know how to use it correctly.

Establish and provide ongoing training for employees, supervisors and managers to ensure that everyone at your worksite can recognize hazards and how to control them.

These points are crucial to a safe and healthful workplace for you and your employees, making it more difficult for accidents to occur and for work-related health problems to develop.

Develop and Implement Your Action Plan

Developing an action plan to build a safety and health program around the four points can serve as a "road map" to take your program to where you want it to be. An action plan tells you what has to be done, the logical order in which to do it, who is responsible and where you want to be when you finish. It describes problems and solutions, but is not ironclad. An action plan can and should be changed to correspond with changes in the workplace.

A good action plan has two parts:

1. A list of major changes or improvements to make your safety and health program effective. Each item should be prioritized, have a target date for completion and identify who is responsible for implementation.
2. A specific plan to implement each major change or improvement, including what you want to accomplish, the steps required, who will be assigned to do what and a schedule for completion. A worksheet to help you design an overall action plan and describe specific action steps appears in Appendix A.

Once a plan is established, put it into action, beginning with the highest priority item. Ensure that it is realistic, manageable and addresses the steps you have planned for that item. A detailed description of the steps required will help you keep track of your progress. Keep in mind that you can work on more than one item at a time and that priorities may change as other needs are identified or as your company's resources change.

Open communication with your employees is crucial to the success of your efforts. Their cooperation depends on them understanding what the safety and health program is all about, why it is important to them and how it affects their work. The more you do to involve them in the changes you are making, the smoother your transition will be.

Putting your action plan into operation at your workplace will be a major step toward implementing an effective safety and health program.

Remember, a safety and health program is a plan put into practice. Keep your program on track by periodically checking its progress and by calling on a state consultant when you need assistance.

Any good management system requires periodic review. Take a careful look at each component of your safety and health program to determine what is working well and what changes are needed. Once again, a state consultant can assist you in this area. Any necessary improvements can be turned into new safety and health objectives for the coming year. Developing new action plans to implement these improvements will continue progress toward an effective safety and health program, reduce your safety and health risks, and increase efficiency and profit.

Remember that it is important to document your activities. The best way to evaluate the success of your safety and health program is to have documentation of what you have done, which provides guidance on how you can make it work even better.

Technical assistance may be available to you as a small business owner or manager through your insurance carrier; your fellow business-people; suppliers of your durable equipment and raw materials; the local safety council; and many local, state and Federal agencies, including the state on-site Consultation Programs and closest OSHA Area Office.

Establishing a quality safety and health management system will take time and involve some resources, but you should be pleased with the results. Employees will feel reassured because of your commitment to their safety and health on the job. You may save money through increased productivity and reduced workers' compensation insurance costs. You may gain increased respect in your community. The tangible and intangible rewards for a solid safety and health program far outweigh the cost of an accident, injury or workplace fatality.

SELF-INSPECTION

The most widely accepted way to identify hazards is to conduct safety and health inspections because the only way to be certain of an actual situation is to look at it directly from time to time.

Begin a program of self-inspection in your own workplace. Self-inspection is essential if you are to know where probable hazards exist and whether they are under control.

This section includes checklists designed to assist you in self-inspection fact-finding. The checklists can give you some indication of where to begin taking action to make your business safer and more healthful for all of your employees. These checklists are by no means all-inclusive and not all of the checklists will apply to your business. You might want to start by selecting the areas that are most critical to your business, then expanding your self-inspection checklists over time to fully cover all areas that pertain to your business. Remember that a checklist is a tool to help, not a definitive statement of what is mandatory. Use checklists only for guidance.

Don't spend time with items that have no application to your business. Make sure that each item is seen by you or your designee and leave nothing to memory or chance. Write down what you see or

don't see and what you think you should do about it.

Add information from your completed checklists to injury information, employee information, and process and equipment information to build a foundation to help you determine what problems exist. Then, as you use the OSHA standards in your problem-solving process, it will be easier for you to determine the actions needed to solve these problems.

Once the hazards have been identified, institute the control procedures described at page 9 and establish your four-point safety and health program.

Self-Inspection Scope

Your self-inspections should cover safety and health issues in the following areas:

- Processing, Receiving, Shipping and Storage - equipment, job planning, layout, heights, floor loads, projection of materials, material handling and storage methods, training for material handling equipment.
- Building and Grounds Conditions - floors, walls, ceilings, exits, stairs, walkways, ramps, platforms, driveways, aisles.
- Housekeeping Program - waste disposal, tools, objects, materials, leakage and spillage, cleaning methods, schedules, work areas, remote areas, storage areas.
- Electricity - equipment, switches, breakers, fuses, switch-boxes, junctions, special fixtures, circuits, insulation, extensions, tools, motors, grounding, national electric code compliance.
- Lighting - type, intensity, controls, conditions, diffusion, location, glare and shadow control.
- Heating and Ventilation - type, effectiveness, temperature, humidity, controls, natural and artificial ventilation and exhausting.
- Machinery - points of operation, flywheels, gears, shafts, pulleys, key ways, belts, couplings, sprockets, chains, frames, controls, lighting for tools and equipment, brakes, exhausting, feeding, oiling, adjusting, maintenance, lockout/tagout, grounding, work space, location, purchasing standards.
- Personnel - training, including hazard identification training; experience; methods of checking machines before use; type of clothing; PPE; use of guards; tool storage; work practices; methods for cleaning, oiling, or adjusting machinery.
- Hand and Power Tools - purchasing standards, inspection, storage, repair, types, maintenance, grounding, use and handling.
- Chemicals - storage, handling, transportation, spills, disposals, amounts used, labeling, toxicity or other harmful effects, warning signs, supervision, training, protective clothing and equipment, hazard communication requirements.

Fire Prevention - extinguishers, alarms, sprinklers, smoking rules, exits, personnel assigned, separation of flammable materials and dangerous operations, explosion-proof fixtures in hazardous locations, waste disposal and training of personnel.

- Maintenance - provide regular and preventive maintenance on all equipment used at the worksite, recording all work performed on the machinery and by training personnel on the proper care and servicing of the equipment.
- PPE - type, size, maintenance, repair, age, storage, assignment of responsibility, purchasing methods, standards observed, training in care and use, rules of use, method of assignment.
- Transportation - motor vehicle safety, seat belts, vehicle maintenance, safe driver programs.
- First Aid Program/Supplies - medical care facilities locations, posted emergency phone numbers, accessible first aid kits.
- Evacuation Plan - establish and practice procedures for an emergency evacuation, e.g., fire, chemical/biological incidents, bomb threat; include escape procedures and routes, critical plant operations, employee accounting following an evacuation, rescue and medical duties and ways to report emergencies.

Self-Inspection Checklists

These checklists are by no means all-inclusive. You should add to them or delete items that do not apply to your business; however, carefully consider each item and then make your decision. You should refer to OSHA standards for specific guidance that may apply to your work situation. (Note: These checklists are typical for general industry but not for construction or maritime industries.)

EMPLOYER POSTING

- Is the required OSHA Job Safety and Health Protection Poster displayed in a prominent location where all employees are likely to see it?
- Are emergency telephone numbers posted where they can be readily found in case of emergency?
- Where employees may be exposed to toxic substances or harmful physical agents, has appropriate information concerning employee access to medical and exposure records and Material Safety Data Sheets (MSDSs) been posted or otherwise made readily available to affected employees?
- Are signs concerning exit routes, room capacities, floor loading, biohazards, exposures to x-ray, microwave, or other harmful radiation or substances posted where appropriate?
- Is the Summary of Work-Related Injuries and Illnesses (OSHA Form 300A) posted during the months of February, March and April?

SAFETY AND HEALTH PROGRAM

- Do you have an active safety and health program in operation that includes general safety and health program elements as well as the management of hazards specific to your work-site?
- Is one person clearly responsible for the safety and health program?

- Do you have a safety committee or group made up of management and labor representatives that meets regularly and reports in writing on its activities?

MEDICAL SERVICES AND FIRST AID

- Is there a hospital, clinic, or infirmary for medical care near your workplace or is at least one employee on each shift currently qualified to render first aid?
- Have all employees who are expected to respond to medical emergencies as part of their job responsibilities received first aid training; had hepatitis B vaccination made available to them; had appropriate training on procedures to protect them from bloodborne pathogens, including universal precautions; and have available and understand how to use appropriate PPE to protect against exposure to bloodborne diseases?*

*Pursuant to an OSHA memorandum of July 1, 1992, employees who render first aid only as a collateral duty do not have to be offered pre-exposure hepatitis B vaccine only if the employer includes and implements the following requirements in his/her exposure control plan: (1) the employer must record all first aid incidents involving the presence of blood or other potentially infectious materials before the end of the work shift during which the first aid incident occurred; (2) the employer must comply with post-exposure evaluation, prophylaxis and follow-up requirements of the Bloodborne Pathogens standard with respect to "exposure incidents," as defined by the standard; (3) the employer must train designated first aid providers about the reporting procedure; (4) the employer must offer to initiate the hepatitis B vaccination series within 24 hours to all unvaccinated first aid providers who have rendered assistance in any situation involving the presence of blood or other potentially infectious materials.

- If employees have had an exposure incident involving bloodborne pathogens, was an immediate post-exposure medical evaluation and follow-up provided?
- Are medical personnel readily available for advice and consultation on matters of employees' health?
- Are emergency phone numbers posted?
- Are fully supplied first aid kits easily accessible to each work area, periodically inspected and replenished as needed?
- Have first aid kits and supplies been approved by a physician, indicating that they are adequate for a particular area or operation?
- Is there an eye-wash station or sink available for quick drenching or flushing of the eyes and body in areas where corrosive liquids or materials are handled?

FIRE PROTECTION

- Is your local fire department familiar with your facility, its location and specific hazards?
- If you have a fire alarm system, is it certified as required and tested annually?
- If you have interior standpipes and valves, are they inspected regularly?
- If you have interior standpipes and valves, are they inspected regularly?
- If you have outside private fire hydrants, are they flushed at least once a year and on a routine preventive maintenance schedule?
- Are fire doors and shutters in good operating condition?
- Are fire doors and shutters unobstructed and protected against obstructions, including their counterweights?
- Are fire door and shutter fusible links in place?
- Are automatic sprinkler system water control valves, air and water pressure checked periodically as required?
- Is the maintenance of automatic sprinkler systems assigned to responsible persons or to a sprinkler contractor?
- Are sprinkler heads protected by metal guards if exposed to potential physical damage?
- Is proper clearance maintained below sprinkler heads?
- Are portable fire extinguishers provided in adequate number and type and mounted in readily accessible locations?
- Are fire extinguishers recharged regularly with this noted on the inspection tag?
- Are employees periodically instructed in the use of fire extinguishers and fire protection procedures?

PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING

- Has the employer determined whether hazards that require the use of PPE (e.g., head, eye, face, hand, or foot protection) are present or are likely to be present?
- If hazards or the likelihood of hazards are found, are employers selecting appropriate and properly fitted PPE suitable for protection from these hazards and ensuring that affected employees use it?
- Have both the employer and the employees been trained on PPE procedures, i.e., what PPE is necessary for job tasks, when workers need it, and how to properly wear and adjust it?
- Are protective goggles or face shields provided and worn where there is any danger of flying particles
- Are approved safety glasses required to be worn at all times in areas where there is a risk of eye injuries such as punctures, abrasions, contusions, or burns?

- ❑ Are employees who wear corrective lenses (glasses or contacts) in workplaces with harmful exposures required to wear only approved safety glasses, protective goggles, or use other medically approved
- ❑ Are protective gloves, aprons, shields, or other means provided and required where employees could be cut or where there is reasonably anticipated exposure to corrosive liquids, chemicals, blood, or other potentially infectious materials? See the OSHA Bloodborne Pathogens standard, 29 CFR 1910.1030(b), for the definition of "other potentially infectious materials."
- ❑ Are hard hats required, provided and worn where danger of falling objects exists?
- ❑ Are hard hats periodically inspected for damage to the shell and suspension system?
- ❑ Is appropriate foot protection required where there is the risk of foot injuries from hot, corrosive, or poisonous substances, falling objects, crushing, or penetrating actions?
- ❑ Are approved respirators provided when needed? (See 29 CFR 1910.134 for detailed information on respirators or check [OSHA's website](#)).
- ❑ Is all PPE maintained in a sanitary condition and ready for use?
- ❑ Are food or beverages consumed only in areas where there is no exposure to toxic material, blood, or other potentially infectious materials?
- ❑ Is protection against the effects of occupational noise provided when sound levels exceed those of the OSHA Noise standard?
- ❑ Are adequate work procedures, PPE and other equipment provided and used when cleaning up spilled hazardous materials?
- ❑ Are appropriate procedures in place to dispose of or decontaminate PPE contaminated with, or reasonably anticipated to be contaminated with, blood or other potentially infectious materials?

GENERAL WORK ENVIRONMENT

- ❑ Are all worksites clean, sanitary and orderly?
- ❑ Are work surfaces kept dry and appropriate means taken to assure the surfaces are slip-resistant?
- ❑ Are all spilled hazardous materials or liquids, including blood and other potentially infectious materials, cleaned up immediately and according to proper procedures?
- ❑ Is combustible scrap, debris and waste stored safely and removed from the worksite promptly?
- ❑ Is all regulated waste, as defined in the OSHA Bloodborne Pathogens standard (29 CFR 1910.1030), discarded according to Federal, state and local regulations?
- ❑ Are accumulations of combustible dust routinely removed from elevated surfaces including the overhead structure of buildings, etc.?

- Is combustible dust cleaned up with a vacuum system to prevent suspension of dust particles in the environment?
- Is metallic or conductive dust prevented from entering or accumulating on or around electrical enclosures or equipment?
- Are covered metal waste cans used for oily or paint-soaked waste?
- Are all oil and gas-fired devices equipped with flame failure controls to prevent flow of fuel if pilots or main burners are not working?
- Are paint spray booths, dip tanks, etc., cleaned regularly?
- Are the minimum number of toilets and washing facilities provided and maintained in a clean and sanitary fashion?
- Are all work areas adequately illuminated?
- Are pits and floor openings covered or otherwise guarded?
- Have all confined spaces been evaluated for compliance with 29 CFR 1910.146? (Permit required confined spaces.)

WALKWAYS

- Are aisles and passageways kept clear and marked as appropriate?
- Are wet surfaces covered with non-slip materials?
- Are holes in the floor, sidewalk, or other walking surface repaired properly, covered, or otherwise made safe?
- Is there safe clearance for walking in aisles where motorized or mechanical handling equipment is operating?
- Are materials or equipment stored in such a way that sharp projections will not interfere with the walkway?
- Are spilled materials cleaned up immediately?
- Are changes of direction or elevations readily identifiable?
- Are aisles or walkways that pass near moving or operating machinery, welding operations, or similar operations arranged so employees will not be subjected to potential hazards?
- Is adequate headroom provided for the entire length of any aisle or walkway?
- Are standard guardrails provided wherever aisle or walkway surfaces are elevated more than 30 inches (76.20 centimeters) above any adjacent floor or the ground?
- Are bridges provided over conveyors and similar hazards?

FLOOR AND WALL OPENINGS

- ❑ Are floor openings guarded by a cover, a guardrail, or equivalent on all sides (except at stairways or ladder entrances)?
- ❑ Are toeboards installed around the edges of permanent floor openings where persons may pass below the opening?
- ❑ Are skylight screens able to withstand a load of at least 200 pounds (90.7 kilograms)?
- ❑ Is the glass in windows, doors, glass walls, etc., subject to possible human impact, of sufficient thickness and type for the condition of use?
- ❑ Are grates or similar type covers over floor openings such as floor drains designed to allow unimpeded foot traffic or rolling equipment?
- ❑ Are unused portions of service pits and pits not in use either covered or protected by guardrails or equivalent?
- ❑ Are manhole covers, trench covers and similar covers, and their supports designed to carry a truck rear axle load of at least 20,000 pounds (9,072 kilograms) when located in roadways and subject to vehicle traffic?
- ❑ Are floor or wall openings in fire-resistant construction provided with doors or covers compatible with the fire rating of the structure and provided with a self-closing feature when appropriate?

STAIRS AND STAIRWAYS

- ❑ Do standard stair rails or handrails on all stairways have at least four risers?
- ❑ Are all stairways at least 22 inches (55.88 centimeters) wide?
- ❑ Do stairs have landing platforms not less than 30 inches (76.20 centimeters) in the direction of travel and extend 22 inches (55.88 centimeters) in width at every 12 feet (3.6576 meters) or less of vertical rise?
- ❑ Do stairs angle no more than 50 and no less than 30 degrees?
- ❑ Are stairs of hollow-pan type treads and landings filled to the top edge of the pan with solid material?
- ❑ Are step risers on stairs uniform from top to bottom?
- ❑ Are steps slip-resistant?
- ❑ Are stairway handrails located between 30 inches (76.20 centimeters) and 34 inches (86.36 centimeters) above the leading edge of stair treads?

- Do stairway handrails have at least 3 inches (7.62 centimeters) of clearance between the handrails and the wall or surface they are mounted on?
- Where doors or gates open directly on a stairway, is a platform provided so the swing of the door does not reduce the width of the platform to less than 21 inches (53.34 centimeters)?
- Are stairway handrails capable of withstanding a load of 200 pounds (90.7 kilograms), applied within 2 inches (5.08 centimeters) of the top edge in any downward or outward direction?
- Where stairs or stairways exit directly into any area where vehicles may be operated, are adequate barriers and warnings provided to prevent employees from stepping into the path of traffic?
- Do stairway landings have a dimension measured in the direction of travel at least equal to the width of the stairway?
- Is the vertical distance between stairway landings limited to 12 feet (3.6576 meters) or less?

ELEVATED SURFACES

- Are signs posted, when appropriate, showing the elevated surface load capacity?
- Are surfaces that are elevated more than 30 inches (76.20 centimeters) provided with standard guardrails?
- Are surfaces that are elevated more than 30 inches (76.20 centimeters) provided with standard guardrails?
- Are all elevated surfaces beneath which people or machinery could be exposed to falling objects provided with standard 4-inch (10.16centimeter) toeboards?
- Is a permanent means of access and egress provided to elevated storage and work surfaces?
- Is required headroom provided where necessary?
- Is material on elevated surfaces piled, stacked, or racked in a manner to prevent it from tipping, falling, collapsing, rolling, or spreading?
- Are dock boards or bridge plates used when transferring materials between docks and trucks or railcars?

EXITING OR EGRESS - EVACUATION

- Are all exits marked with an exit sign and illuminated by a reliable light source?
- Are the directions to exits, when not immediately apparent, marked with visible signs?
- Are doors, passageways or stairways that are neither exits nor access to exits, but could be mistaken for exits, appropriately marked "NOT AN EXIT," "TO BASEMENT," "STOREROOM," etc.?

- Are exit signs labeled with the word "EXIT" in lettering at least 5 inches (12.70 centimeters) high and the stroke of the lettering at least 1/2inch (1.2700 centimeters) wide?
- Are exit doors side-hinged?
- Are all exits kept free of obstructions?
- Are at least two means of egress provided from elevated platforms, pits, or rooms where the absence of a second exit would increase the risk of injury from hot, poisonous, corrosive, suffocating, flammable, or explosive substances?
- Are there sufficient exits to permit prompt escape in case of emergency?
- Are special precautions taken to protect employees during construction and repair operations?
- Is the number of exits from each floor of a building and the number of exits from the building itself appropriate for the building occupancy load?
- Are exit stairways that are required to be separated from other parts of a building enclosed by at least 2-hour fire-resistive construction in buildings more than four stories in height, and not less than 1-hour fire-resistive construction elsewhere?
- Where ramps are used as part of required exiting from a building, is the ramp slope limited to 1 foot (0.3048 meter) vertical and 12 feet (3.6576 meters) horizontal?
- Where exiting will be through frameless glass doors, glass exit doors, storm doors, etc., are the doors fully tempered and meet the safety requirements for human impact?

HAND TOOLS AND EQUIPMENT

- Are all tools and equipment (both company and employee-owned) used at the workplace in good condition?
- Are hand tools, such as chisels, punches, etc., which develop mushroomed heads during use, reconditioned or replaced as necessary?
- Are broken or fractured handles on hammers, axes and similar equipment replaced promptly?
- Are worn or bent wrenches replaced?
- Are appropriate handles used on files and similar tools?
- Are employees aware of hazards caused by faulty or improperly used hand tools?
- Are appropriate safety glasses, face shields, etc., used while using hand tools or equipment that might produce flying materials or be subject to breakage?
- Are jacks checked periodically to ensure they are in good operating condition?
- Are tool handles wedged tightly into the heads of all tools?
- Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?

- Are tools stored in a dry, secure location where they cannot be tampered with?
- Is eye and face protection used when driving hardened or tempered studs or nails?

PORTABLE (POWER OPERATED) TOOLS AND EQUIPMENT

- Are grinders, saws and similar equipment provided with appropriate safety guards?
- Are power tools used with proper shields, guards, or attachments, as recommended by the manufacturer?
- Are portable circular saws equipped with guards above and below the base shoe?
- Are circular saw guards checked to ensure that they are not wedged up, leaving the lower portion of the blade unguarded
- Are rotating or moving parts of equipment guarded to prevent physical contact?
- Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?
- Are effective guards in place over belts, pulleys, chains and sprockets on equipment such as concrete mixers, air compressors, etc.?
- Are portable fans provided with full guards or screens having openings 1/2 inch (1.2700 centimeters) or less?
- Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?
- Are ground-fault circuit interrupters provided on all temporary electrical 15 and 20 ampere circuits used during periods of construction?
- Are pneumatic and hydraulic hoses on power-operated tools checked regularly for deterioration or damage?

ABRASIVE WHEEL EQUIPMENT GRINDERS

- Is the work rest used and kept adjusted to within 1/8 inch (0.3175 centimeter) of the wheel?
- Is the adjustable tongue on the top side of the grinder used and kept adjusted to within 1/4 inch (0.6350 centimeters) of the wheel?
- Do side guards cover the spindle, nut and flange and 75 percent of the wheel diameter?
- Are bench and pedestal grinders permanently mounted?
- Are goggles or face shields always worn when grinding?
- Is the maximum revolutions per minute (rpm) rating of each abrasive wheel compatible with the rpm rating of the grinder motor?

- Are fixed or permanently mounted grinders connected to their electrical supply system with metallic conduit or other permanent wiring method?
- Does each grinder have an individual on and off control switch?
- Is each electrically operated grinder effectively grounded?
- Are new abrasive wheels visually inspected and ring tested before they are mounted?
- Are dust collectors and powered exhausts provided on grinders used in operations that produce large amounts of dust?
- Are splash guards mounted on grinders that use coolant to prevent the coolant from reaching employees?
- Is cleanliness maintained around grinders?

POWER-ACTUATED TOOLS

- Are employees who operate power-actuated tools trained in their use and required to carry a valid operator's card?
- Is each power-actuated tool stored in its own locked container when not being used?
- Is a sign at least 7 inches (17.78 centimeters) by 10 inches (25.40 centimeters) with bold face type reading "POWER-ACTUATED TOOL IN USE" conspicuously posted when the tool is being used?
- Are power-actuated tools left unloaded until they are ready to be used?
- Are power-actuated tools inspected for obstructions or defects each day before use?
- Do power-actuated tool operators have and use appropriate PPE such as hard hats, safety goggles, safety shoes and ear protectors?

MACHINE GUARDING

- Is there a training program to instruct employees on safe methods of machine operation?
- Is there adequate supervision to ensure that employees are following safe machine operating procedures?
- Is there a regular program of safety inspection of machinery and equipment?
- Is all machinery and equipment kept clean and properly maintained?
- Is sufficient clearance provided around and between machines to allow for safe operations, set up and servicing, material handling and waste removal?
- Is equipment and machinery securely placed and anchored to prevent tipping or other movement that could result in personal injury?

- ❑ Is there a power shut-off switch within reach of the operator's position at each machine?
- ❑ Can electric power to each machine be locked out for maintenance, repair, or security?
- ❑ Are the noncurrent-carrying metal parts of electrically operated machines bonded and grounded?
- ❑ Are foot-operated switches guarded or arranged to prevent accidental actuation by personnel or falling objects?
- ❑ Are manually operated valves and switches controlling the operation of equipment and machines clearly identified and readily accessible?
- ❑ Are all emergency stop buttons colored red?
- ❑ Are all pulleys and belts within 7 feet (2.1336 meters) of the floor or working level properly guarded?
- ❑ Are all moving chains and gears properly guarded?
- ❑ Are splash guards mounted on machines that use coolant to prevent the coolant from reaching employees?
- ❑ Are methods provided to protect the operator and other employees in the machine area from hazards created at the point of operation, ingoing nip points, rotating parts, flying chips and sparks?
- ❑ Are machine guards secure and arranged so they do not cause a hazard while in use?
- ❑ If special hand tools are used for placing and removing material, do they protect the operator's hands?
- ❑ Are revolving drums, barrels and containers guarded by an enclosure that is interlocked with the drive mechanism so that revolution cannot occur unless the guard enclosure is in place?
- ❑ Do arbors and mandrels have firm and secure bearings, and are they free from play?
- ❑ Are provisions made to prevent machines from automatically starting when power is restored after a power failure or shutdown?
- ❑ Are machines constructed so as to be free from excessive vibration when the largest size tool is mounted and run at full speed?
- ❑ If machinery is cleaned with compressed air, is air pressure controlled and PPE or other safeguards utilized to protect operators and other workers from eye and body injury?
- ❑ Are fan blades protected with a guard having openings no larger than 1/2 inch (1.2700 centimeters) when operating within 7 feet (2.1336 meters) of the floor?
- ❑ Are saws used for ripping equipped with anti-kickback devices and spreaders?
- ❑ Are radial arm saws so arranged that the cutting head will gently return to the back of the table when released?

INDUSTRIAL TRUCKS - FORKLIFTS

- Are employees properly trained in the use of the type of industrial truck they operate?
- Are only trained personnel allowed to operate industrial trucks?
- Is substantial overhead protective equipment provided on high lift rider equipment?
- Are the required lift truck operating rules posted and enforced?
- Is directional lighting provided on each industrial truck that operates in an area with less than 2 foot candles per square foot of general lighting?
- Does each industrial truck have a warning horn, whistle, gong, or other device that can be clearly heard above normal noise in the areas where it is operated?
- Are the brakes on each industrial truck capable of bringing the vehicle to a complete and safe stop when fully loaded?
- Does the parking brake of the industrial truck prevent the vehicle from moving when unattended?
- Are industrial trucks that operate where flammable gases, vapors, combustible dust, or ignitable fibers may be present approved for such locations?
- Are motorized hand and hand/rider trucks designed so that the brakes are applied and power to the drive motor shuts off when the operator releases his or her grip on the device that controls the truck's travel?
- Are industrial trucks with internal combustion engines that are operated in buildings or enclosed areas carefully checked to ensure that such operations do not cause harmful concentrations of dangerous gases or fumes?
- Are safe distances maintained from the edges of elevated ramps and platforms?
- Are employees prohibited from standing or passing under elevated portions of trucks, whether loaded or empty?
- Are unauthorized employees prohibited from riding on trucks?
- Are operators prohibited from driving up to anyone standing in front of a fixed object?
- Are arms and legs kept inside the running lines of the truck?
- Are loads handled only within the rated capacity of the truck?
- Are trucks in need of repair removed from service immediately?

SPRAYING OPERATIONS

- Is adequate ventilation provided before spraying operations are started?

- Is mechanical ventilation provided when spraying operations are performed in enclosed areas?
- When mechanical ventilation is provided during spraying operations, is it so arranged that it will not circulate the contaminated air?
- Is the spray area free of hot surfaces and at least 20 feet (6.096 meters) from flames, sparks, operating electrical motors and other ignition sources?
- Are portable lamps used to illuminate spray areas suitable for use in a hazardous location?
- Is approved respiratory equipment provided and used when appropriate during spraying operations?
- Do solvents used for cleaning have a flash point to 100 degrees Fahrenheit (deg. F) or more?
- Are fire control sprinkler heads kept clean?
- Are "NO SMOKING" signs posted in spray areas, paint rooms, paint booths and paint storage areas?
- Is the spray area kept clean of combustible residue?
- Are spray booths constructed of metal, masonry, or other substantial noncombustible material?
- Are spray booth floors and baffles noncombustible and easily cleaned?
- Is infrared drying apparatus kept out of the spray area during spraying operations and is the spray booth completely ventilated before using the drying apparatus?
- Is the electric drying apparatus properly grounded?
- Are lighting fixtures for spray booths located outside the booth with the interior lighted through sealed clear panels?
- Are the electric motors for exhaust fans placed outside booths or ducts?
- Are belts and pulleys inside the booth fully enclosed?
- Do ducts have access doors to allow cleaning?
- Do all drying spaces have adequate ventilation?

ENVIRONMENTAL CONTROLS

- Are all work areas properly illuminated?
- Are employees instructed in proper first aid and other emergency procedures?
- Are hazardous substances, blood and other potentially infectious materials, which may cause harm by inhalation, ingestion, or skin absorption or contact, identified?
- Are employees aware of the hazards involved with the various chemicals they may be exposed to in their work environment, such as ammonia, chlorine, epoxies, caustics, etc.?

- Is employee exposure to chemicals in the workplace kept within acceptable levels?
- Can a less harmful method or product be used?
- Is the work area ventilation system appropriate for the work performed?
- Are spray painting operations performed in spray rooms or booths equipped with an appropriate exhaust system?
- Is employee exposure to welding fumes controlled by ventilation, use of respirators, exposure time limits, or other means?
- Are welders and other nearby workers provided with flash shields during welding operations?
- If forklifts and other vehicles are used in buildings or other enclosed areas, are the carbon monoxide levels kept below maximum acceptable concentration?
- Has there been a determination that noise levels in the facilities are within acceptable levels?
- Are steps being taken to use engineering controls to reduce excessive noise levels?
- Are proper precautions being taken when handling asbestos and other fibrous materials?
- Are caution labels and signs used to warn of hazardous substances (e.g., asbestos) and biohazards (e.g., bloodborne pathogens)?
- Are wet methods used, when practicable, to prevent the emission of airborne asbestos fibers, silica dust and similar hazardous materials?
- Are engineering controls examined and maintained or replaced on a scheduled basis?
- Is vacuuming with appropriate equipment used whenever possible rather than blowing or sweeping dust?
- Are grinders, saws and other machines that produce respirable dusts vented to an industrial collector or central exhaust system?
- Are all local exhaust ventilation systems designed to provide sufficient air flow and volume for the application, and are ducts not plugged and belts not slipping?
- Is PPE provided, used and maintained wherever required?
- Are there written standard operating procedures for the selection and use of respirators where needed?
- Are restrooms and washrooms kept clean and sanitary?
- Is all water provided for drinking, washing and cooking potable?
- Are all outlets for water that is not suitable for drinking clearly identified?
- Are employees' physical capacities assessed before they are assigned to jobs requiring heavy work?
- Are employees instructed in the proper manner for lifting heavy objects?

- Where heat is a problem, have all fixed work areas been provided with spot cooling or air conditioning?
- Are employees screened before assignment to areas of high heat to determine if their health might make them more susceptible to having an adverse reaction?
- Are employees working on streets and roadways who are exposed to the hazards of traffic required to wear bright colored (traffic orange) warning vests?
- Are exhaust stacks and air intakes located so that nearby contaminated air will not be recirculated within a building or other enclosed area?
- Is equipment producing ultraviolet radiation properly shielded?
- Are universal precautions observed where occupational exposure to blood or other potentially infectious materials can occur and in all instances where differentiation of types of body fluids or potentially infectious materials is difficult or impossible?

FLAMMABLE AND COMBUSTIBLE MATERIALS

- Are combustible scrap, debris and waste materials (oily rags, etc.) stored in covered metal receptacles and promptly removed from the worksite?
- Is proper storage practiced to minimize the risk of fire, including spontaneous combustion?
- Are approved containers and tanks used to store and handle flammable and combustible liquids?
- Are all connections on drums and combustible liquid piping, vapor and liquid tight?
- Are all flammable liquids kept in closed containers when not in use (e.g., parts cleaning tanks, pans, etc.)?
- Are bulk drums of flammable liquids grounded and bonded to containers during dispensing?
- Do storage rooms for flammable and combustible liquids have explosion-proof lights and mechanical or gravity ventilation?
- Is liquefied petroleum gas stored, handled and used in accordance with safe practices and standard
- Are "NO SMOKING" signs posted on liquefied petroleum gas tanks and in areas where flammable or combustible materials are used or stored?
- Are liquefied petroleum storage tanks guarded to prevent damage from vehicles?
- Are all solvent wastes and flammable liquids kept in fire-resistant, covered containers until they are removed from the worksite?
- Is vacuuming used whenever possible rather than blowing or sweeping combustible dust?

- Are firm separators placed between containers of combustibles or flammables that are stacked one upon another to ensure their support and stability?
- Are fuel gas cylinders and oxygen cylinders separated by distance and fire-resistant barriers while in storage?
- Are fire extinguishers selected and provided for the types of materials in the areas where they are to be used?
- Class A - Ordinary combustible material fires.
- Class B - Flammable liquid, gas or grease fires.
- Class C - Energized-electrical equipment fires.
- Are appropriate fire extinguishers mounted within 75 feet (22.86 meters) of outside areas containing flammable liquids and within 10 feet (3.048 meters) of any inside storage area for such materials?
- Are extinguishers free from obstructions or blockage?
- Are all extinguishers serviced, maintained and tagged at intervals not to exceed one year?
- Are all extinguishers fully charged and in their designated places?
- Where sprinkler systems are permanently installed, are the nozzle heads so directed or arranged that water will not be sprayed into operating electrical switchboards and equipment?
- Are safety cans used for dispensing flammable or combustible liquids at the point of use?
- Are all spills of flammable or combustible liquids cleaned up promptly?
- Are storage tanks adequately vented to prevent the development of excessive vacuum or pressure as a result of filling, emptying, or atmosphere temperature changes?
- Are storage tanks equipped with emergency venting that will relieve excessive internal pressure caused by fire exposure?
- Are rules enforced in areas involving storage and use of hazardous materials?

HAZARDOUS CHEMICAL EXPOSURE

- Are employees aware of the potential hazards and trained in safe handling practices for situations involving various chemicals stored or used in the workplace such as acids, bases, caustics, epoxies, phenols, etc.?
- Is employee exposure to chemicals kept within acceptable levels?
- Are eye-wash fountains and safety showers provided in areas where corrosive chemicals are handled?

- Are all containers, such as vats, storage tanks, etc., labeled as to their contents, e.g., "CAUSTICS"?
- Are all employees required to use personal protective clothing and equipment when handling chemicals (gloves, eye protection, respirators, etc.)?
- Are flammable or toxic chemicals kept in closed containers when not in use?
- Are chemical piping systems clearly marked as to their content?
- Where corrosive liquids are frequently handled in open containers or drawn from storage vessels or pipelines, are adequate means readily available for neutralizing or disposing of spills or overflows and performed properly and safely?
- Are standard operating procedures established and are they being followed when cleaning up chemical spills?
- Are respirators stored in a convenient, clean and sanitary location, and are they adequate for emergencies?
- Are employees prohibited from eating in areas where hazardous chemicals are present?
- Is PPE used and maintained whenever necessary?
- Are there written standard operating procedures for the selection and use of respirators where needed?
- If you have a respirator protection program, are your employees instructed on the correct usage and limitations of the respirators?
- Are the respirators National Institute for Occupational Safety and Health (NIOSH) approved for this particular application?
- Are they regularly inspected, cleaned, sanitized and maintained?
- If hazardous substances are used in your processes, do you have a medical or biological monitoring system in operation?
- Are you familiar with the threshold limit values or permissible exposure limits of airborne contaminants and physical agents used in your workplace?
- Have appropriate control procedures been instituted for hazardous materials, including safe handling practices and the use of respirators and ventilation systems?
- Whenever possible, are hazardous substances handled in properly designed and exhausted booths or similar locations?
- Do you use general dilution or local exhaust ventilation systems to control dusts, vapors, gases, fumes, smoke, solvents, or mists that may be generated in your workplace?
- Is operational ventilation equipment provided for removal of contaminants from production grinding, buffing, spray painting, and/or vapor degreasing?

- Do employees complain about dizziness, headaches, nausea, irritation, or other factors of discomfort when they use solvents or other chemicals?
- Is there a dermatitis problem? Do employees complain about dryness, irritation, or sensitization of the skin?
- Have you considered having an industrial hygienist or environmental health specialist evaluate your operation?
- If internal combustion engines are used, is carbon monoxide kept within acceptable levels?
- Is vacuuming used rather than blowing or sweeping dust whenever possible for cleanup?
- Are materials that give off toxic, asphyxiant, suffocating, or anesthetic fumes stored in remote or isolated locations when not in use?

VOLUNTARY PROTECTION PROGRAMS (VPP)

OSHA's VPP provide an opportunity for labor, management and government to work together cooperatively to further the goal of providing effective safety and health protection in the workplace. The VPP grant recognition to worksites that provide or are committed to providing effective protection for their employees through implementation of systematically managed safety and health programs. The Star Program is for worksites that have at least one year's experience with an effectively implemented safety and health program. The Merit Program is for worksites working toward an effectively implemented program. The Demonstration Program is for worksites with programs at Star quality but with some aspect of their program that requires further study by OSHA. All participants work in partnership with OSHA and provide models for OSHA and for their industries.

OSHA STRATEGIC PARTNERSHIP PROGRAM (OSPP)

OSPP is designed to enable groups of employers, employees and employee representatives to partner with OSHA and enter into an extended, voluntary, cooperative relationship in order to encourage, assist and recognize efforts to eliminate serious hazards and achieve a high level of worker safety and health.

OSHA ALLIANCE PROGRAM

Alliances are goal-oriented written agreements between OSHA and organizations to work together to prevent workplace injuries and illnesses. Organizations include employers, employees, labor unions, trade or professional groups, educational institutions and government agencies. Alliances

focus on one or more of the following goals: training and education, outreach and communications, and promoting the national dialogue on occupational safety and health.

States with Approved Plans

The Occupational Safety and Health Act of 1970 encourages states to develop and operate their own job safety and health programs. OSHA approves and monitors state plans and provides up to 50 percent of an approved plan's operating costs.

Twenty-four states, Puerto Rico and the Virgin Islands currently operate approved state plans.

These state plans operate under authority of state law and are required to be, in structure and performance, "at least as effective as" the Federal OSHA Program. Although many states have adopted standards and procedures identical to Federal standards, states may have different or additional requirements parallel to those described in the Federal program.

To determine which set of standards and regulations apply to you, you need to know whether you are covered by a state plan or subject to Federal OSHA. Please visit [State Occupational Safety and Health Plans](#), call the OSHA Area Office nearest you, or (800) 321-OSHA to obtain this information.

If you are subject to state enforcement, the OSHA Area Office will refer you to your state office which can provide all relevant information, such as whether the state is using the Federal standards, information on the poster and record keeping requirements, and special services available to small businesses. The state office also can provide you with further assistance, including directing you to the free, on-site consultation services described above.

See the list of OSHA-approved state plans at [OSHA's website](#).

A Guide to Scaffold Use in the Construction Industry

Small Business Safety Management Series

OSHA 3150
2002 (Revised)



This informational booklet is intended to provide a generic, non-exhaustive overview of a particular standards-related topic. This publication does not itself alter or determine compliance responsibilities, which are set forth in OSHA standards themselves and the *Occupational Safety and Health Act of 1970*.

Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements, the reader should consult current administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the courts.

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A Guide to Scaffold Use in the Construction Industry

Small Business Safety Management Series

U.S. Department of Labor

What are the highlights of the scaffolding standard?



OSHA's scaffolding standard has several key provisions:

- Fall protection or fall arrest systems -- Each employee more than 10 feet above a lower level shall be protected from falls by guardrails or a fall arrest system, except those on single-point and two-point adjustable suspension scaffolds. Each employee on a single-point and two-point adjustable suspended scaffold shall be protected by both a personal fall arrest system and a guardrail. **1926.451(g)(1)**
- Guardrail height -- The height of the toprail for scaffolds manufactured and placed in service after January 1, 2000 must be between 38 inches (0.9 meters) and 45 inches (1.2 meters). The height of the toprail for scaffolds manufactured and placed in service before January 1, 2000 can be between 36 inches (0.9 meters) and 45 inches (1.2 meters). **1926.451(g)(4)(ii)**
- Crossbracing -- When the crosspoint of crossbracing is used as a toprail, it must be between 38 inches (0.97 m) and 48 inches (1.3 meters) above the work platform. **1926.451(g)(4)(xv)**
- Midrails -- Midrails must be installed approximately halfway between the toprail and the platform surface. When a crosspoint of crossbracing is used as a midrail, it must be between 20 inches (0.5 meters) and 30 inches (0.8 m) above the work platform. **1926.451(g)(4)**
- Footings -- Support scaffold footings shall be level and capable of supporting the loaded scaffold. The legs, poles, frames, and uprights shall bear on base plates and mud sills. **1926.451(c)(2)**
- Platforms -- Supported scaffold platforms shall be fully planked or decked. **1926.451(b)**
- Guying ties, and braces -- Supported scaffolds with a height-to-base of more than 4:1 shall be restrained from tipping by guying, tying, bracing, or the equivalent. **1926.451(c)(1)**
- Capacity -- Scaffolds and scaffold components must support at least 4 times the maximum intended load. Suspension scaffold rigging must at least 6 times the intended load. **1926.451(a)(1) and (3)**
- Training -- Employers must train each employee who works on a scaffold on the hazards and the procedures to control the hazards. **1926.454**
- Inspections -- Before each work shift and after any occurrence that could affect the structural integrity, a competent person must inspect the scaffold and scaffold components for visible defects. **1926.451(f)(3)**
- Erecting and Dismantling -- When erecting and dismantling supported scaffolds, a competent person² must determine the feasibility of providing a safe means of access and fall protection for these operations. **1926.451(e)(9) & (g)(2)**

² See the standard's requirements for and definition of a competent person in the next question.

When is a competent person required for scaffolding?

OSHA's scaffolding standard defines a competent person as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions, which are unsanitary, hazardous to employees, and who has authorization to take prompt corrective measures to eliminate them."

When is a qualified person required for scaffolding?

The standard defines a qualified person as "one who -- by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience -- has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project."

The qualified person must perform the following duties in these circumstances:

- *In General:*
 - To design and load scaffolds in accordance with that design. **1926.451(a)(6)**
- *For Training:*
 - To train employees working on the scaffolds to recognize the associated hazards and understand procedures to control or minimize those hazards. **1926.454(a)**
- *For Suspension Scaffolds:*
 - To design the rigging for single-point adjustable suspension scaffolds. **1926.452(o)(2)(i)**
 - To design platforms on two-point adjustable suspension types that are less than 36 inches (0.9 m) wide to prevent instability. **1926.452(p)(1)**
 - To make swaged attachments or spliced eyes on wire suspension ropes. **1926.451(d)(11)**
- *For Components and Design:*
 - To design scaffold components construction in accordance with the design. **1926.451(a)(6)**

When is an engineer required?

The standard requires a registered professional engineer to perform the following duties in these circumstances:

- *For Suspension Scaffolds:*
 - To design the direct connections of masons' multi-point adjustable suspension scaffolds.
- *For Design:*
 - To design scaffolds that are to be moved when employees are on them. **1926.451(f)(5)**
 - To design pole scaffolds over 60 feet (18.3 meters) in height. **1926.452(a)(10)**
 - To design tube and coupler scaffolds over 125 feet (38 meters) in height. **1926.452(b)(10)**
 - To design fabricated frame scaffolds over 125 feet (38 meters) in height above their base

plates. **1926.452(c)(6)**

- To design brackets on fabricated frame scaffolds used to support cantilevered loads in addition to workers. **1926.452(c)(5)**

- To design outrigger scaffolds and scaffold components. **1926.452(i)(8)**

What other standards apply to scaffolds?

29 *CFR* contains other standards that apply to construction work such as the responsibility to initiate and maintain programs (**1926.29(b)(1)**); exposures to dusts and chemicals (**1926.33, .55, .59, .62, and .1101**); hand and power tools (**1926.300 - .307**); electrical (**1926.300 - .449**); personal fall arrest systems (**1926.502**); and ladders (**1926.1050 - .1060**).

General Requirements for Scaffolds §1926.451

Capacity

What are the capacity requirements for all scaffolds?

Each scaffold and scaffold component must support without failure its own weight and at least four times the maximum intended load applied or transmitted to it. **1926.451(a)(1)**

A qualified person must design the scaffolds, which are loaded in accordance with that design. **1926.451(a)(6)**

Scaffolds and scaffold components must not be loaded in excess of their maximum intended loads or rated capacities, whichever is less. **1926.451(f)(1)**

Load carrying timber members should be a minimum of 1,500 lb-f/in² construction grade lumber. **Appendix A (1)(a)**

Scaffold Platform Construction

What are scaffold platform construction requirements?

Each platform must be planked and decked as fully as possible with the space between the platform and uprights not more than 1 inch (2.5 centimeters) wide. The space must not exceed 9 inches (24.1 centimeters) when side brackets or odd-shaped structures result in a wider opening between the platform and the uprights. **1926.451(b)(1)**

What are the requirements for scaffold planking?

Scaffold planking must be able to support, without failure, its own weight and at least four times the intended load. **1926.451(a)(1)**

Solid sawn wood, fabricated planks, and fabricated platforms may be used as scaffold planks

following the recommendations by the manufacturer or a lumber grading association or inspection agency. **Appendix A (1)(b) and (c)**

Tables showing maximum permissible spans, rated load capacity, and nominal thickness are in **Appendix A (1)(b) & (c)** of the standard.

What is the maximum deflection of a platform?

The platform must not deflect more than 1/60 of the span when loaded. **1926.451(f)(16)**

Are there requirements for work on platforms cluttered with debris?

The standard prohibits work on platforms cluttered with debris. **1926.451(f)(13)**

How wide does the work area need to be on scaffolding?

Each scaffold platform and walkway must be at least 18 inches (46 centimeters) wide. When the work area is less than 18 inches (46 centimeters) wide, guardrails and/or personal fall arrest systems must be used. **1926.451(b)(2)**

Are guardrails required on all open sides of scaffolding?

The standard requires employers to protect each employee on a scaffold more than 10 feet (3.1 m) above a lower level from falling to that lower level. **1926.451(g)(1)**

To ensure adequate protection, install guardrails along all open sides and ends before releasing the scaffold for use by employees, other than the erection and dismantling crews. **1926.451(g)(4)**

Guardrails are not required, however,

- When the front end of all platforms are less than 14 inches (36 centimeters) from the face of the work; **1926.451(b)(3)**
- When outrigger scaffolds are 3 inches (8 centimeters) or less from the front edge; **1926.451(b)(3)(i)**
- When employees are plastering and lathing 18 inches (46 centimeters) or less from the front edge. **1926.451(b)(3)(ii)**

What materials are unacceptable for guardrails?

Steel or plastic banding must not be used as a toprail or a midrail. **1926.451(g)(4)(xiii)**

Criteria for Supported Scaffolds

What are supported scaffolds?

Supported scaffolds are platforms supported by legs, outrigger beams, brackets, poles, uprights, posts, frames, or similar rigid support. **1926.451(b)**

The structural members, poles, legs, posts, frames, and uprights, must be plumb and braced to prevent swaying and displacement. **1926.451(c)(3)**

Do employees working on supported scaffolds need to be trained?

All employees must be trained by a qualified person to recognize the hazards associated with the type of scaffold being used and how to control or minimize those hazards. The training must include fall hazards, falling object hazards, electrical hazards, proper use of the scaffold, and handling of materials. **1926.454(a)**

When do supported scaffolds need to be restrained from tipping?

Supported scaffolds with a height to base width ratio of more than 4:1 must be restrained by guying, tying, bracing, or an equivalent means. **1926.451(c)(1)**

How can one prevent supported scaffolding from tipping?

Either the manufacturers' recommendation or the following placements must be used for guys, ties, and braces:

- Install guys, ties, or braces at the closest horizontal member to the 4:1 height and repeat vertically with the top restraint no further than the 4:1 height from the top.
- Vertically -- every 20 feet (6.1 meters) or less for scaffolds less than three feet (0.91 meters) wide; every 26 feet (7.9 meters) or less for scaffolds more than three feet (0.91 meters) wide.
- Horizontally -- at each end; at intervals not to exceed 30 feet (9.1 meters) from one end.

1926.451(c)(1)

What are the footing and foundation requirements for supported scaffolds?

Supported scaffolds' poles, legs, posts, frames, and uprights must bear on base plates and mud sills, or other adequate firm foundation. **1926.451(c)(2)(i) and (ii)**

May forklifts, front-end loaders, or similar equipment support platforms?

Forklifts can support platforms only when the entire platform is attached to the fork and the forklift does not move horizontally when workers are on the platform. **1926.451(c)(2)(v)**

Front-end loaders and similar equipment can support scaffold platforms only when they have been specifically designed by the manufacturer for such use. **1926.451(c)(2)(iv)**

What materials can be used to increase the working level height of employees on supported scaffolds?

Stilts may be used on a large area scaffold. When a guardrail system is used, the guardrail height must be increased in height equal to the height of the stilts. The manufacturer must approve any

alterations to the stilts. **1926.452(v)**

Note: A large area scaffold consists of a pole, tube and coupler systems, or a fabricated frame scaffold erected over substantially the entire work area. **1926.451(b)**

Criteria for Suspended Scaffolds

What are suspension scaffolds?

A suspension scaffold contains one or more platforms suspended by ropes or other non-rigid means from an overhead structure, **1926.450(b)**, such as the following scaffolds: single-point, multipoint, multi-level, two-point, adjustable, boatswains' chair, catenary, chimney hoist, continuous run, elevator false car, go-devils, interior hung, masons', and stone setters'.

Are there requirements for suspension scaffolds?

Some of the requirements for all types of suspension scaffolds include:

- Employers must ensure that all employees are trained to recognize the hazards associated with the type of scaffold being used. **1926.451(d)(1)**
- All support devices must rest on surfaces capable of supporting at least four times the load imposed on them by the scaffold when operating at the rated load of the hoist, or at least one-and-a-half times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater. **1926.451(d)(1)**
- A competent person must evaluate all direct connections prior to use to confirm that the supporting surfaces are able to support the imposed load, **1926.451(d)(1)**
- All suspension scaffolds must be tied or otherwise secured to prevent them from swaying, as determined by a competent person. **1926.451(d)**
- Guardrails, a personal fall arrest system, or both must protect each employee more than 10 feet (3.1 meters) above a lower level from falling. **1926.451(g)**
- A competent person must inspect ropes for defects prior to each work shift and after every occurrence that could affect a rope's integrity. **1926.451(d)(10)**
- When scaffold platforms are more than 24 inches (61 centimeters) above or below a point of access, ladders, ramps, walkways, or similar surfaces must be used. **1926.451(e)(1)**
- When using direct access, the surface must not be more than 24 inches (61 centimeters) above or 14 inches (36 cm) horizontally from the surface. **1926.451(e)(8)**
- When lanyards are connected to horizontal lifelines or structural members on single-point or two-point adjustable scaffolds, the scaffold must have additional independent support lines equal in number and strength to the suspension lines and have automatic locking devices. **1926.451(g)(3)(iii)**
- Emergency escape and rescue devices must not be used as working platforms, unless designed to function as suspension scaffolds and emergency systems. **1926.451(d)(19)**

Are there specific requirements for counterweights?

Counterweights used to balance adjustable suspension scaffolds must be able to resist at least four times the tipping moment imposed by the scaffold operating at either the rated load of the hoist, or one-and-a-half (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater. **1926.451(a)(2)**

Only those items specifically designed as counterweights must be used. **1926.451(d)(3)(iii)**

Counterweights used for suspended scaffolds must be made of materials that can not be easily dislocated. Flowable material, such as sand or water, cannot be used. **1926.451(d)(3)(ii)**

Counterweights must be secured by mechanical means to the outrigger beams. **1926.451(d)(3)(iv)**

Vertical lifelines must not be fastened to counterweights. **1926.451(g)(3)(i)**

Can sand, masonry units, or rolls of roofing felt be used for counterweights?

No. Such materials cannot be used as counterweights. **1926.451(d)(3)(ii) and (iii)**

What are the specific requirements for outrigger beams?

Outrigger beams (thrust-outs) are the structural members of a suspension or outrigger scaffold that provide support. **1926.450(b)** They must be placed perpendicular to their bearing support. **1926.451(d)(3)(viii)**

Where do tiebacks for outrigger beams, cornice hooks, roof hooks, roof irons, parapet clamps, or similar devices need to be secured?

Tiebacks must be secured to a structurally sound anchorage on the building or structure. Sound anchorages do not include standpipes, vents, other piping systems, or electrical conduit. **1926.451(d)(3)(ix) and (d)(5)**

How do tiebacks need to be installed?

A single tieback must be installed perpendicular to the face of the building or structure. Two tiebacks installed at opposing angles are required when a perpendicular tieback cannot be installed. **1926.451(d)(3)(x)**

What are the requirements for suspension ropes?

The suspension ropes must be long enough to allow the scaffold to be lowered to the level below without the rope passing through the hoist, or the end of the rope configured to prevent the end from passing through the hoist. **1926.451(d)(6)**

The standard prohibits using repaired wire. **1926.451(d)(7)**

Drum hoists must contain no less than four wraps of the rope at the lowest point. **1926.451(d)(6)**

Employers must replace wire rope when the following conditions exist: kinks; six randomly broken wires in one rope lay or three broken wires in one strand in one lay; one third of the original diameter of the outside wires is lost; heat damage; evidence that the secondary brake has engaged the rope; and any other physical damage that impairs the function and strength of the rope.

1926.451(d)(10)

Suspension ropes supporting adjustable suspension scaffolds must be a diameter large enough to provide sufficient surface area for the functioning of brake and hoist mechanisms. **1926.451(f)(10)**

Suspension ropes must be shielded from heat-producing processes. **1926.451(f)(11)**

What are some of the requirements for power-operated suspension scaffold hoists?

Power-operated hoists used to raise or lower a suspended scaffold must be tested and listed by a qualified testing laboratory. **1926.451(d)(13)**

The stall load of any scaffold hoist must not exceed three times its rated load. **1926.451(a)(5)**

The stall load is the load at which the prime-mover (motor or engine) of a power-operated hoist stalls or the power to the prime-mover is automatically disconnected. **1926.451(b)**

Gasoline power-operated hoists or equipment are not permitted. **1926.451(d)(14)**

Drum hoists must contain no less than four wraps of suspension rope at the lowest point of scaffold travel. **1926.451(d)(6)**

Gears and brakes must be enclosed. **1926.451(d)(15)**

An automatic braking and locking device, in addition to the operating brake, must engage when a hoist makes an instantaneous change in momentum or an accelerated overspeed. **1926.451(d)(16)**

What are some of the requirements for manually operated suspension scaffold hoists?

Manually operated hoists used to raise or lower a suspended scaffold must be tested and listed by a qualified testing laboratory. **1926.451(d)(13)**

These hoists require a positive crank force to descend. **1926.451(d)(17)**

When can welding be done from a suspension scaffold?

Welding can be done from suspended scaffolds when

- A grounding conductor is connected from the scaffold to the structure and is at least the size of the welding lead;
 - The grounding conductor is not attached in series with the welding process or the work piece;
 - An insulating material covers the suspension wire rope and extends at least four feet (1.2 meters) above the hoist;
 - Insulated protective covers cover the hoist;
 - The tail line is guided, retained, or both, so that it does not become grounded;
 - Each suspension rope is attached to an insulated thimble; and
 - Each suspension rope and any other independent lines are insulated from grounding.
- 1926.451(f)(17)**

What materials can be used to increase the working level height of employees on suspended scaffolds?

No materials or devices may be used to increase the working height on a suspension scaffold. This includes ladders, boxes, and barrels. **1926.451(f)(14) and (15)**

Access Requirements

What are the requirements for access to scaffolds?

Employers must provide access when the scaffold platforms are more than 2 feet (0.6 meters) above or below a point of access. **1926.451(e)(1)**

Direct access is acceptable when the scaffold is not more than 14 inches (36 centimeters) horizontally and not more than 24 inches (61 centimeters) vertically from the other surfaces. **1926.451(e)(8)**

The standard prohibits the use of crossbraces as a means of access. **1926.451(e)(1)**

What types of access can be used?

Several types of access are permitted:

- Ladders, such as portable, hook-on, attachable, and stairway **1926.451 (e)(2)**,
- Stair towers **1926.451(e)(4)**,
- Ramps and walkways **1926.451(e)(5)**, and
- Integral prefabricated frames (**1926.451(e)(6)**).

What are the access requirements for employees erecting and dismantling supported scaffolds?

Employees erecting and dismantling supported scaffolding must have a safe means of access provided when a competent person has determined the feasibility and analyzed the site conditions.

1926.451(e)***Use Requirements*****Does the standard prohibit any types of scaffolds?**

Shore and lean-to scaffolds are strictly prohibited. **1926.451(f)(2)**

Also, employees are prohibited from working on scaffolds covered with snow, ice, or other slippery materials, except to remove these substances. **1926.451(f)(8)**

What are the clearance distances between scaffolds and powerlines?

The standard requires specific clearance distances. See page 42 of this publication and **1926.451(f)(6)** for a table listing those distances.

Fall Protection Requirements**What is fall protection?**

Fall protection includes guardrail systems and personal fall arrest systems. Guardrail systems are explained below in another question. Personal fall arrest systems include harnesses, components of the harness/belt such as Dee-rings, and snap hooks, lifelines, and anchorage point. **1926.451(g)(3)**

Vertical or horizontal lifelines may be used. **1926.451(g)(3)(ii) through (iv)**

Lifelines must be independent of support lines and suspension ropes and not attached to the same anchorage point as the support or suspension ropes. **1926.451(g)(3)(iii) and (iv)**

When working from an aerial lift, attach the fall arrest system to the boom or basket. **1926.453(b)(2)(v)**

What are the fall protection requirements for all scaffolds?

Employers must provide fall protection for each employee on a scaffold more than 10 feet (3.1 meters) above a lower level. **1926.451(g)(1)**

A competent person must determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. **1926.451(g)(2)**

How will I know what kind of fall protection to provide for a specific-type of scaffold?

The chart on the next page illustrates the type of fall protection required for specific scaffolds.

<i>Type of Scaffold</i>	<i>Fall Protection Required</i>
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Aerial lifts	Personal fall arrest system
Boatswains' chair	Personal fall arrest system
Catenary scaffold	Personal fall arrest system
Crawling board (chicken ladder)	Personal fall arrest system, or a guardrail system, or by a 3/4 inch (1.9 cm) diameter grabline or equivalent handhold securely fastened beside each crawling board
Float scaffold	Personal fall arrest system
Ladder jack scaffold	Personal fall arrest system
Needle beam scaffold	Personal fall arrest system
Self-contained scaffold	Both a personal adjustable scaffold arrest system and a guardrail system
Single-point and two-point suspension scaffolds	Both a personal fall arrest system and a guardrail system
Supported scaffold	Personal fall arrest system or guardrail system
All other scaffolds not specified above	Personal fall arrest system or guardrail systems that meet the required criteria
Welding from suspension scaffolds	1926.451(f)(17)
Wire rope clips	1926.451(d)(12)
Window jack scaffolds	1926.452(l)

This guideline is to assist the compliance officer to determine if there is an effective project plan to qualify for a Focused Inspection.

	YES/NO
<p>PROJECT SAFETY AND HEALTH COORDINATION: Are there procedures in place by the general contractor, prime contractor, or other such entity to ensure that all employers provide adequate protection for their employees?</p>	
<p>Is there a DESIGNATED COMPETENT PERSON responsible for the implementation and monitoring of the project safety and health plan who is capable of identifying existing and predictable hazards and has authority to take prompt corrective measures?</p>	
<p>PROJECT SAFETY AND HEALTH PROGRAM/PLAN* that complies with 1926 Subpart C and addresses, based upon the size and complexity of the project, the following:</p>	
<p>_____ Project Safety Analysis at initiation and at critical stages that describes the sequence, procedures, and responsible individuals for safe construction.</p> <p>_____ Identification of work/activities requiring planning, design, inspection, or supervision by an engineer, competent person, or other professional.</p> <p>_____ Evaluation monitoring of subcontractors to determine conformance with the Project Plan. (The Project Plan may include, or be utilized by subcontractors.)</p> <p>_____ Supervisor and employee training according to the Project Plan including recognition, reporting, and avoidance of hazards, and applicable standards.</p> <p>_____ Procedures for controlling hazardous operations such as: cranes, scaffolding, trenches, confined spaces, hot work, explosives, hazardous materials, leading edges, etc.</p> <p>_____ Documentation of: training, permits, hazard reports, inspections, uncorrected hazards, incidents, and near misses.</p> <p>_____ Employee involvement in the hazard: analysis, prevention, avoidance, correction, and reporting.</p> <p>_____ Project emergency response plan.</p> <p>* FOR EXAMPLES, SEE OWNER AND CONTRACTOR ASSOCIATION MODEL PROGRAMS, ANSI A10.33, A10.38, ETC.</p>	
<p>The walkaround and interviews confirmed that the Plan has been implemented, including:</p> <p>_____ The four leading hazards are addressed: falls, struck by, caught in/between, electrical.</p> <p>_____ Hazards are identified and corrected with preventative measures instituted in a timely manner.</p> <p>_____ Employees and supervisors are knowledgeable of the project safety and health plan, avoidance of hazards, applicable standards, and their rights and responsibilities.</p>	

THE PROJECT QUALIFIED FOR A FOCUSED INSPECTION.	
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Regulatory Text

PART 1926 -- [AMENDED]

1. Subpart L of Part 1926 is revised to read as follows:

SUBPART L -- SCAFFOLDS

Sec.

1926.450 Scope, Application, and Definitions Applicable to this Subpart 1926.451 General Requirements

1926.452 Additional Requirements Applicable to Specific Types of Scaffolds

1926.453 Aerial Lifts

1926.454 Training

Appendix A to Subpart L -- Scaffolds

Appendix B to Subpart L -- Scaffolds

Appendix C to Subpart L -- Scaffolds

Appendix D to Subpart L -- Scaffolds

Appendix E to Subpart L -- Scaffolds

Authority: Section 107, *Contract Work Hours and Safety Standards Act* (Construction Safety Act) (40 U.S.C. 333); Secs. 4, 6, 8, *Occupational Safety and Health Act* of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 1-90 (55 FR 9033); and 29 CFR Part 1911.

SUBPART L -- SCAFFOLDS**§1926.450 Scope, application and definitions applicable to this Subpart.**

(a) **Scope and application.** This subpart applies to all scaffolds used in workplaces covered by this Part. It does not apply to crane or derrick suspended personnel platforms, which are covered by §1926.550(g). The criteria for aerial lifts are set out exclusively in §1926.453.

(b) **Definitions.** "Adjustable suspension scaffold" means a suspension scaffold equipped with a hoist(s) that can be operated by an employee(s) on the scaffold.

"Bearer (putlog)" means a horizontal transverse scaffold member (which may be supported by ledgers or runners) upon which the scaffold platform rests and which joins scaffold uprights, posts, poles, and similar members.

"Boatswains' chair" means a single-point adjustable suspension scaffold consisting of a seat or sling designed to support one employee in a sitting position.

"Body belt (safety belt)" means a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

"Body harness" means a design of straps which may be secured about the employee in a manner to distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders, with means for attaching it to other components of a personal fall arrest system.

"Brace" means a rigid connection that holds one scaffold member in a fixed position with respect to another member, or to a building or structure.

"Bricklayers' square scaffold" means a supported scaffold composed of framed squares which support a platform.

"Carpenters' bracket scaffold" means a supported scaffold consisting of a platform supported by brackets attached to building or structural walls.

"Catenary scaffold" means a suspension scaffold consisting of a platform supported by two essentially horizontal and parallel ropes attached to structural members of a building or other structure. Additional support may be provided by vertical pickups.

"Chimney hoist" means a multi-point adjustable suspension scaffold used to provide access to work inside chimneys. (See "Multi-point adjustable suspension scaffold".)

"Cleat" means a structural block used at the end of a platform to prevent the platform from slipping off its supports. Cleats are also used to provide footing on sloped surfaces such as crawling boards.

"Competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

"Continuous run scaffold" (Run scaffold) means a two-point or multi-point adjustable suspension scaffold constructed using a series of interconnected braced scaffold members or supporting structures erected to form a continuous scaffold.

"Coupler" means a device for locking together the tubes of a tube and coupler scaffold.

"Crawling board (chicken ladder)" means a supported scaffold consisting of a plank with cleats spaced and secured to provide footing, for use on sloped surfaces such as roofs.

"Deceleration device" means any mechanism, such as a rope grab, rip-stitch lanyard, speciallywoven lanyard, tearing or deforming lanyard, or automatic self-retracting lifeline lanyard, which dissipates a substantial amount of energy during a fall arrest or limits the energy imposed on an employee during fall arrest.

"Double pole (independent pole) scaffold" means a supported scaffold consisting of a platform(s) resting on cross beams (bearers) supported by ledgers and a double row of uprights independent of support (except ties, guys, braces) from any structure.

"Equivalent" means alternative designs, materials or methods to protect against a hazard which the

employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

"Eye" or "Eye Splice" means a loop with or without a thimble at the end of a wire rope.

"Exposed power lines" means electrical power lines which are accessible to employees and which are not shielded from contact. Such lines do not include extension cords or power tool cords.

"Fabricated decking and planking" means manufactured platforms made of wood (including laminated wood, and solid sawn wood planks), metal or other materials.

"Fabricated frame scaffold (tubular welded frame scaffold)" means a scaffold consisting of a platform(s) supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.

"Failure" means load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

"Float (ship) scaffold" means a suspension scaffold consisting of a braced platform resting on two parallel bearers and hung from overhead supports by ropes of fixed length.

"Form scaffold" means a supported scaffold consisting of a platform supported by brackets attached to formwork.

"Guardrail system" means a vertical barrier, consisting of, but not limited to, top rails, midrails, and posts, erected to prevent employees from falling off a scaffold platform or walkway to lower levels.

"Hoist" means a manual or power-operated mechanical device to raise or lower a suspended scaffold.

"Horse scaffold" means a supported scaffold consisting of a platform supported by construction horses (saw horses). Horse scaffolds constructed of metal are sometimes known as trestle scaffolds.

"Independent pole scaffold" (see "Double pole scaffold").

"Interior hung scaffold" means a suspension scaffold consisting of a platform suspended from the ceiling or roof structure by fixed length supports.

"Ladder jack scaffold" means a supported scaffold consisting of a platform resting on brackets attached to ladders.

"Ladder stand" means a mobile, fixed-size, self-supporting ladder consisting of a wide flat tread ladder in the form of stairs.

"Landing" means a platform at the end of a flight of stairs.

"Large area scaffold" means a pole scaffold, tube and coupler scaffold, systems scaffold, or fabricated frame scaffold erected over substantially the entire work area. For example: a scaffold erected over the entire floor area of a room.

"Lean-to scaffold" means a supported scaffold which is kept erect by tilting it toward and resting it against a building or structure. "Lifeline" means a component consisting of a flexible line that connects to an anchorage at one end to hang vertically (vertical lifeline), or that connects to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

"Lower levels" means areas below the level where the employee is located and to which an employee can fall. Such areas include, but are not limited to, ground levels, floors, roofs, ramps, runways, excavations, pits, tanks, materials, water, and equipment.

"Masons' adjustable supported scaffold" (see "Self-contained adjustable scaffold").

"Masons' multi-point adjustable suspension scaffold" means a continuous run suspension scaffold designed and used for masonry operations.

"Maximum intended load" means the total load of all persons, equipment, tools, materials, transmitted loads, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time. "Mobile scaffold" means a powered or unpowered, portable, caster or wheel-mounted supported scaffold.

"Multi-level suspended scaffold" means a two-point or multi-point adjustable suspension scaffold with a series of platforms at various levels resting on common stirrups.

"Multi-point adjustable suspension scaffold" means a suspension scaffold consisting of a platform(s) which is suspended by more than two ropes from overhead supports and equipped with means to raise and lower the platform to desired work levels. Such scaffolds include chimney hoists.

"Needle beam scaffold" means a platform suspended from needle beams. "Open sides and ends" means the edges of a platform that are more than 14 inches (36 cm) away horizontally from a sturdy, continuous, vertical surface (such as a building wall) or a sturdy, continuous horizontal surface (such as a floor), or a point of access. Exception: For plastering and lathing operations the horizontal threshold distance is 18 inches (46 cm).

"Outrigger" means the structural member of a supported scaffold used to increase the base width of a scaffold in order to provide support for and increased stability of the scaffold.

"Outrigger beam (Thrustout)" means the structural member of a suspension scaffold or outrigger scaffold which provides support for the scaffold by extending the scaffold point of attachment to a point out and away from the structure or building.

"Outrigger scaffold" means a supported scaffold consisting of a platform resting on outrigger beams

(thrustouts) projecting beyond the wall or face of the building or structure, the inboard ends of which are secured inside the building or structure.

"Overhand bricklaying" means the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. It includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

"Personal fall arrest system" means a system used to arrest an employee's fall. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or combinations of these.

"Platform" means a work surface elevated above lower levels. Platforms can be constructed using individual wood planks, fabricated planks, fabricated decks, and fabricated platforms.

"Pole scaffold" (see definitions for "Single-pole scaffold" and "Double (independent) pole scaffold").

"Power operated hoist" means a hoist which is powered by other than human energy.

"Pump jack scaffold" means a supported scaffold consisting of a platform supported by vertical poles and movable support brackets.

"Qualified" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/ her ability to solve or resolve problems related to the subject matter, the work, or the project.

"Rated load" means the manufacturer's specified maximum load to be lifted by a hoist or to be applied to a scaffold or scaffold component.

"Repair bracket scaffold" means a supported scaffold consisting of a platform supported by brackets which are secured in place around the circumference or perimeter of a chimney, stack, tank or other supporting structure by one or more wire ropes placed around the supporting structure.

"Roof bracket scaffold" means a rooftop supported scaffold consisting of a platform resting on angular shaped supports.

"Runner" (ledger or ribbon)" means the lengthwise horizontal spacing or bracing member which may support the bearers.

"Scaffold" means any temporary elevated platform (supported or suspended) and its supporting structure (including points of anchorage), used for supporting employees or materials or both.

"Self-contained adjustable scaffold" means a combination supported and suspension scaffold consisting of an adjustable platform(s) mounted on an independent supporting frame(s) not a part of the object being worked on, and which is equipped with a means to permit the raising and lowering

of the platform(s). Such systems include rolling roof rigs, rolling outrigger systems, and some masons' adjustable supported scaffolds.

"Shore scaffold" means a supported scaffold which is placed against a building or structure and held in place with props.

"Single-point adjustable suspension scaffold" means a suspension scaffold consisting of a platform suspended by one rope from an overhead support and equipped with means to permit the movement of the platform to desired work levels.

"Single-pole scaffold" means a supported scaffold consisting of a platform(s) resting on bearers, the outside ends of which are supported on runners secured to a single row of posts or uprights, and the inner ends of which are supported on or in a structure or building wall.

"Stair tower (Scaffold stairway/tower)" means a tower comprised of scaffold components and which contains internal stairway units and rest platforms. These towers are used to provide access to scaffold platforms and other elevated points such as floors and roofs.

"Stall load" means the load at which the prime mover of a power-operated hoist stalls or the power to the prime-mover is automatically disconnected.

"Step, platform, and trestle ladder scaffold" means a platform resting directly on the rungs of step ladders or trestle ladders.

"Stilts" means a pair of poles or similar supports with raised footrests, used to permit walking above the ground or working surface.

"Stonesetters' multi-point adjustable suspension scaffold" means a continuous run suspension scaffold designed and used for stonesetters' operations.

"Supported scaffold" means one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.

"Suspension scaffold" means one or more platforms suspended by ropes or other non-rigid means from an overhead structure(s).

"System scaffold" means a scaffold consisting of posts with fixed connection points that accept runners, bearers, and diagonals that can be interconnected at predetermined levels.

"Tank builders' scaffold" means a supported scaffold consisting of a platform resting on brackets that are either directly attached to a cylindrical tank or attached to devices that are attached to such a tank.

"Top plate bracket scaffold" means a scaffold supported by brackets that hook over or are attached to the top of a wall. This type of scaffold is similar to carpenters' bracket scaffolds and form scaffolds and is used in residential construction for setting trusses.

"Tube and coupler scaffold" means a supported or suspended scaffold consisting of a platform(s) supported by tubing, erected with coupling devices connecting uprights, braces, bearers, and runners.

"Tubular welded frame scaffold" (see "Fabricated frame scaffold").

"Two-point suspension scaffold (swing stage)" means a suspension scaffold consisting of a platform supported by hangers (stirrups) suspended by two ropes from overhead supports and equipped with means to permit the raising and lowering of the platform to desired work levels.

"Unstable objects" means items whose strength, configuration, or lack of stability may allow them to become dislocated and shift and therefore may not properly support the loads imposed on them. Unstable objects do not constitute a safe base support for scaffolds, platforms, or employees. Examples include, but are not limited to, barrels, boxes, loose brick, and concrete blocks.

"Vertical pickup" means a rope used to support the horizontal rope in catenary scaffolds.

"Walkway" means a portion of a scaffold platform used only for access and not as a work level.

"Window jack scaffold" means a platform resting on a bracket or jack which projects through a window opening.

§1926.451 General requirements. This section does not apply to aerial lifts, the criteria for which are set out in §1926.453.

(a) **Capacity** (1) Except as provided in paragraphs (a)(2), (a)(3), (a)(4), (a)(5) and (g) of this section, each scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

(2) Direct connections to roofs and floors, and counterweights used to balance adjustable suspension scaffolds, shall be capable of resisting at least 4 times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.

(3) Each suspension rope, including connecting hardware, used on non-adjustable suspension scaffolds shall be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope.

(4) Each suspension rope, including connecting hardware, used on adjustable suspension scaffolds shall be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope with the scaffold operating at either the rated load of the hoist, or 2 (minimum) times the stall load of the hoist, whichever is greater.

(5) The stall load of any scaffold hoist shall not exceed 3 times its rated load.

(6) Scaffolds shall be designed by a qualified person and shall be constructed and loaded in accordance with that design. Non-mandatory Appendix A to this subpart contains examples of criteria that will enable an employer to comply with paragraph (a) of this section.

(b) Scaffold platform construction.

(1) Each platform on all working levels of scaffolds shall be fully planked or decked between the front uprights and the guardrail supports as follows:

(i) Each platform unit (e.g., scaffold plank, fabricated plank, fabricated deck, or fabricated platform) shall be installed so that the space between adjacent units and the space between the platform and the uprights is no more than 1 inch (2.5 cm) wide, except where the employer can demonstrate that a wider space is necessary (for example, to fit around uprights when side brackets are used to extend the width of the platform).

(ii) Where the employer makes the demonstration provided for in paragraph (b)(1)(i) of this section, the platform shall be planked or decked as fully as possible and the remaining open space between the platform and the uprights shall not exceed 9 inches (24.1 cm).

Exception to paragraph (b)(1): The requirement to provide full planking or decking does not apply to platforms used solely as walkways or solely by employees performing scaffold erection or dismantling. In these situations, only the planking that the employer establishes is necessary to provide safe working conditions is required.

(2) Except as provided in paragraphs (b)(2)(i) and (b)(2)(ii) of this section, each scaffold platform and walkway shall be at least 18 inches (46 cm) wide.

(i) Each ladder jack scaffold, top plate bracket scaffold, roof bracket scaffold, and pump jack scaffold shall be at least 12 inches (30 cm) wide. There is no minimum width requirement for boatswains' chairs.

(ii) Where scaffolds must be used in areas that the employer can demonstrate are so narrow that platforms and walkways cannot be at least 18 inches (46 cm) wide, such platforms and walkways shall be as wide as feasible, and employees on those platforms and walkways shall be protected from fall hazards by the use of guardrails and/or personal fall arrest systems.

(3) Except as provided in paragraphs (b)(3)(i) and (ii) of this section, the front edge of all platforms shall not be more than 14 inches (36 cm) from the face of the work, unless guardrail systems are erected along the front edge and/or personal fall arrest systems are used in accordance with paragraph (g) of this section to protect employees from falling.

(i) The maximum distance from the face for outrigger scaffolds shall be 3 inches (8 cm);

(ii) The maximum distance from the face for plastering and lathing operations shall be 18 inches (46 cm).

(4) Each end of a platform, unless cleated or otherwise restrained by hooks or equivalent means, shall extend over the centerline of its support at least 6 inches (15 cm).

(5) (i) Each end of a platform 10 feet or less in length shall not extend over its support more than 12 inches (30 cm) unless the platform is designed and installed so that the cantilevered portion of the platform is able to support employees and/or materials without tipping, or has guardrails which block employee access to the cantilevered end.

(ii) Each platform greater than 10 feet in length shall not extend over its support more than 18 inches (46 cm), unless it is designed and installed so that the cantilevered portion of the platform is able to support employees without tipping, or has guardrails which block employee access to the cantilevered end.

(6) On scaffolds where scaffold planks are abutted to create a long platform, each abutted end shall rest on a separate support surface. This provision does not preclude the use of common support members, such as "T" sections, to support abutting planks, or hook on platforms designed to rest on common supports.

(7) On scaffolds where platforms are overlapped to create a long platform, the overlap shall occur only over supports, and shall not be less than 12 inches (30 cm) unless the platforms are nailed together or otherwise restrained to prevent movement.

(8) At all points of a scaffold where the platform changes direction, such as turning a corner, any platform that rests on a bearer at an angle other than a right angle shall be laid first, and platforms which rest at right angles over the same bearer shall be laid second, on top of the first platform.

(9) Wood platforms shall not be covered with opaque finishes, except that platform edges may be covered or marked for identification. Platforms may be coated periodically with wood preservatives, fire retardant finishes, and slip-resistant finishes; however, the coating may not obscure the top or bottom wood surfaces.

(10) Scaffold components manufactured by different manufacturers shall not be intermixed unless the components fit together without force and the scaffold's structural integrity is maintained by the user. Scaffold components manufactured by different manufacturers shall not be modified in order to intermix them unless a competent person determines the resulting scaffold is structurally sound.

(11) Scaffold components made of dissimilar metals shall not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component to a level below that required by paragraph (a)(1) of this section.

(c) Criteria for supported scaffolds.

(1) Supported scaffolds with a height to base width (including outrigger supports, if used) ratio of more than four to one (4:1) shall be restrained from tipping by guying, tying, bracing, or equivalent means, as follows:

(i) Guys, ties, and braces shall be installed at locations where horizontal members support both inner and outer legs.

(ii) Guys, ties, and braces shall be installed according to the scaffold manufacturer's recommendations or at the closest horizontal member to the 4:1 height and be repeated vertically at locations of horizontal members every 20 feet (6.1 m) or less thereafter for scaffolds 3 feet (0.91 m) wide or less, and every 26 feet (7.9 m) or less thereafter for scaffolds greater than 3 feet (0.91 m) wide. The top guy, tie or brace of completed scaffolds shall be placed no further than the 4:1 height from the top. Such guys, ties and braces shall be installed at each end of the scaffold and at horizontal intervals not to exceed 30 feet (9.1 m) (measured from one end [not both] towards the other).

(iii) Ties, guys, braces, or outriggers shall be used to prevent the tipping of supported scaffolds in all circumstances where an eccentric load, such as a cantilevered work platform, is applied or is transmitted to the scaffold.

(2) Supported scaffold poles, legs, posts, frames, and uprights shall bear on base plates and mud sills or other adequate firm foundation.

(i) Footings shall be level, sound, rigid, and capable of supporting the loaded scaffold without settling or displacement.

(ii) Unstable objects shall not be used to support scaffolds or platform units.

(iii) Unstable objects shall not be used as working platforms.

(iv) Front-end loaders and similar pieces of equipment shall not be used to support scaffold platforms unless they have been specifically designed by the manufacturer for such use.

(v) Fork-lifts shall not be used to support scaffold platforms unless the entire platform is attached to the fork and the fork-lift is not moved horizontally while the platform is occupied.

(3) Supported scaffold poles, legs, posts, frames, and uprights shall be plumb and braced to prevent swaying and displacement.

(d) Criteria for suspension scaffolds.

(1) All suspension scaffold support devices, such as outrigger beams, cornice hooks, parapet clamps, and similar devices, shall rest on surfaces capable of supporting at least 4 times the load imposed on them by the scaffold operating at the rated load of the hoist (or at least 1.5 times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater).

(2) Suspension scaffold outrigger beams, when used, shall be made of structural metal or equivalent strength material, and shall be restrained to prevent movement.

(3) The inboard ends of suspension scaffold outrigger beams shall be stabilized by bolts or other

direct connections to the floor or roof deck, or they shall have their inboard ends stabilized by counterweights, except masons' multi-point adjustable suspension scaffold outrigger beams shall not be stabilized by counterweights.

(i) Before the scaffold is used, direct connections shall be evaluated by a competent person who shall confirm, based on the evaluation, that the supporting surfaces are capable of supporting the loads to be imposed. In addition, masons' multipoint adjustable suspension scaffold connections shall be designed by an engineer experienced in such scaffold design.

(ii) Counterweights shall be made of non-flowable material. Sand, gravel and similar materials that can be easily dislocated shall not be used as counterweights.

(iii) Only those items specifically designed as counterweights shall be used to counterweight scaffold systems. Construction materials such as, but not limited to, masonry units and rolls of roofing felt, shall not be used as counterweights.

(iv) Counterweights shall be secured by mechanical means to the outrigger beams to prevent accidental displacement.

(v) Counterweights shall not be removed from an outrigger beam until the scaffold is disassembled.

(vi) Outrigger beams which are not stabilized by bolts or other direct connections to the floor or roof deck shall be secured by tiebacks.

(vii) Tiebacks shall be equivalent in strength to the suspension ropes.

(viii) Outrigger beams shall be placed perpendicular to its bearing support (usually the face of the building or structure). However, where the employer can demonstrate that it is not possible to place an outrigger beam perpendicular to the face of the building or structure because of obstructions that cannot be moved, the outrigger beam may be placed at some other angle, provided opposing angle tiebacks are used.

(ix) Tiebacks shall be secured to a structurally sound anchorage on the building or structure. Sound anchorages include structural members, but do not include standpipes, vents, other piping systems, or electrical conduit.

(x) Tiebacks shall be installed perpendicular to the face of the building or structure, or opposing angle tiebacks shall be installed. Single tiebacks installed at an angle are prohibited.

(4) Suspension scaffold outrigger beams shall be:

(i) Provided with stop bolts or shackles at both ends;

(ii) Securely fastened together with the flanges turned out when channel iron beams are used in place of I-beams;

(iii) Installed with all bearing supports perpendicular to the beam center line;

(iv) Set and maintained with the web in a vertical position; and

(v) When an outrigger beam is used, the shackle or clevis with which the rope is attached to the outrigger beam shall be placed directly over the center line of the stirrup.

(5) Suspension scaffold support devices such as cornice hooks, roof hooks, roof irons, parapet clamps, or similar devices shall be:

(i) Made of steel, wrought iron, or materials of equivalent strength;

(ii) Supported by bearing blocks; and

(iii) Secured against movement by tiebacks installed at right angles to the face of the building or structure, or opposing angle tiebacks shall be installed and secured to a structurally sound point of anchorage on the building or structure. Sound points of anchorage include structural members, but do not include standpipes, vents, other piping systems, or electrical conduit.

(iv) Tiebacks shall be equivalent in strength to the hoisting rope.

(6) When winding drum hoists are used on a suspension scaffold, they shall contain not less than four wraps of the suspension rope at the lowest point of scaffold travel. When other types of hoists are used, the suspension ropes shall be long enough to allow the scaffold to be lowered to the level below without the rope end passing through the hoist, or the rope end shall be configured or provided with means to prevent the end from passing through the hoist.

(7) The use of repaired wire rope as suspension rope is prohibited.

(8) Wire suspension ropes shall not be joined together except through the use of eye splice thimbles connected with shackles or coverplates and bolts.

(9) The load end of wire suspension ropes shall be equipped with proper size thimbles and secured by eyesplicing or equivalent means.

(10) Ropes shall be inspected for defects by a competent person prior to each workshift and after every occurrence which could affect a rope's integrity. Ropes shall be replaced if any of the following conditions exist:

(i) Any physical damage which impairs the function and strength of the rope.

(ii) Kinks that might impair the tracking or wrapping of rope around the drum(s) or sheave(s).

(iii) Six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay.

(iv) Abrasion, corrosion, scrubbing, flattening or peening causing loss of more than one-third of the original diameter of the outside wires.

(v) Heat damage caused by a torch or any damage caused by contact with electrical wires.

(vi) Evidence that the secondary brake has been activated during an overspeed condition and has engaged the suspension rope.

(11) Swaged attachments or spliced eyes on wire suspension ropes shall not be used unless they are made by the wire rope manufacturer or a qualified person.

(12) When wire rope clips are used on suspension scaffolds:

(i) There shall be a minimum of 3 wire rope clips installed, with the clips a minimum of 6 rope diameters apart;

(ii) Clips shall be installed according to the manufacturer's recommendations;

(iii) Clips shall be retightened to the manufacturer's recommendations after the initial loading;

(iv) Clips shall be inspected and retightened to the manufacturer's recommendations at the start of each work shift thereafter;

(v) U-bolt clips shall not be used at the point of suspension for any scaffold hoist;

(vi) When U-bolt clips are used, the U-bolt shall be placed over the dead end of the rope, and the saddle shall be placed over the live end of the rope.

(13) Suspension scaffold power-operated hoists and manual hoists shall be tested by a qualified testing laboratory.

(14) Gasoline-powered equipment and hoists shall not be used on suspension scaffolds.

(15) Gears and brakes of power-operated hoists used on suspension scaffolds shall be enclosed.

(16) In addition to the normal operating brake, suspension scaffold power-operated hoists and manually operated hoists shall have a braking device or locking pawl which engages automatically when a hoist makes either of the following uncontrolled movements: an instantaneous change in momentum or an accelerated overspeed.

(17) Manually operated hoists shall require a positive crank force to descend.

(18) Two-point and multi-point suspension scaffolds shall be tied or otherwise secured to prevent them from swaying, as determined to be necessary based on an evaluation by a competent person. Window cleaners' anchors shall not be used for this purpose.

(19) Devices whose sole function is to provide emergency escape and rescue shall not be used as working platforms. (This provision does not preclude the use of systems which are designed to function both as suspension scaffolds and emergency systems.)

(e) **Access.** This paragraph applies to scaffold access for all employees. Access requirements for employees erecting or dismantling supported scaffolds are specifically addressed in paragraph (e)(9) of this section.

(1) When scaffold platforms are more than 2 feet (0.6 m) above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers), stairway-type ladders (such as ladder stands), ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface shall be used. Crossbraces shall not be used as a means of access.

(2) Portable, hook-on, and attachable ladders (Additional requirements for the proper construction and use of portable ladders are contained in Subpart X of this part -- Stairways and Ladders):

(i) Portable, hook-on, and attachable ladders shall be positioned so as not to tip the scaffold;

(ii) Hook-on and attachable ladders shall be positioned so that their bottom rung is not more than 24 inches (61 cm) above the scaffold supporting level;

(iii) When hook-on and attachable ladders are used on a supported scaffold more than 35 feet (10.7 m.) high, they shall have rest platforms at 35-foot (10.7 m) maximum vertical intervals.

(iv) Hook-on and attachable ladders shall be specifically designed for use with the type of scaffold used;

(v) Hook-on and attachable ladders shall have a minimum rung length of 11-1/2 inches (29 cm); and

(vi) Hook-on and attachable ladders shall have uniformly spaced rungs with a maximum spacing between rungs of 16-3/4 inches.

(3) Stairway-type ladders shall:

(i) be positioned such that their bottom step is not more than 24 inches (61 cm) above the scaffold supporting level;

(ii) be provided with rest platforms at 12 foot (3.7 m) maximum vertical intervals;

(iii) have a minimum step width of 16 inches (41 cm), except that mobile scaffold stairway-type ladders shall have a minimum step width of 11 1/2 inches (30 cm); and (iv) have slip-resistant treads on all steps and landings.

(4) Stairtowers (scaffold stairway/towers) shall be positioned such that their bottom step is not more than 24 inches (61 cm.) above the scaffold supporting level.

(i) A stairrail consisting of a toprail and a midrail shall be provided on each side of each scaffold stairway.

(ii) The toprail of each stairrail system shall also be capable of serving as a handrail, unless a separate handrail is provided.

(iii) Handrails, and toprails that serve as handrails, shall provide an adequate handhold for employees grasping them to avoid falling.

(iv) Stairrail systems and handrails shall be surfaced to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.

(v) The ends of stairrail systems and handrails shall be constructed so that they do not constitute a projection hazard.

(vi) Handrails, and toprails that are used as handrails, shall be at least 3 inches (7.6 cm) from other objects.

(vii) Stairrails shall be not less than 28 inches (71 cm) nor more than 37 inches (94 cm) from the upper surface of the stairrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

(viii) A landing platform at least 18 inches (45.7 cm) wide by at least 18 inches (45.7 cm) long shall be provided at each level.

(ix) Each scaffold stairway shall be at least 18 inches (45.7 cm) wide between stairrails.

(x) Treads and landings shall have slip-resistant surfaces.

(xi) Stairways shall be installed between 40 degrees and 60 degrees from the horizontal.

(xii) Guardrails meeting the requirements of paragraph (g)(4) of this section shall be provided on the open sides and ends of each landing.

(xiii) Riser height shall be uniform, within 1/4 inch, (0.6 cm) for each flight of stairs. Greater variations in riser height are allowed for the top and bottom steps of the entire system, not for each flight of stairs.

(xiv) Tread depth shall be uniform, within 1/4 inch, for each flight of stairs.

(5) Ramps and walkways.

(i) Ramps and walkways 6 feet (1.8 m) or more above lower levels shall have guardrail systems which comply with Subpart M of this part -- Fall Protection;

(ii) No ramp or walkway shall be inclined more than a slope of one (1) vertical to three (3) horizontal (20 degrees above the horizontal).

(iii) If the slope of a ramp or a walkway is steeper than one (1) vertical in eight (8) horizontal, the ramp or walkway shall have cleats not more than fourteen

(14) inches (35 cm) apart which are securely fastened to the planks to provide footing.

(6) Integral prefabricated scaffold access frames shall:

(i) Be specifically designed and constructed for use as ladder rungs;

(ii) Have a rung length of at least 8 inches (20 cm);

(iii) Not be used as work platforms when rungs are less than 11-1/2 inches in length, unless each affected employee uses fall protection, or a positioning device, which complies with §1926.502;

(iv) Be uniformly spaced within each frame section;

(v) Be provided with rest platforms at 35-foot (10.7 m) maximum vertical intervals on all supported scaffolds more than 35 feet (10.7 m) high; and

(vi) Have a maximum spacing between rungs of 16 3/4 inches (43 cm). Non-uniform rung spacing caused by joining end frames together is allowed, provided the resulting spacing does not exceed 16-3/4 inches (43 cm).

(7) Steps and rungs of ladder and stairway type access shall line up vertically with each other between rest platforms.

(8) Direct access to or from another surface shall be used only when the scaffold is not more than 14 inches (36 cm) horizontally and not more than 24 inches (61 cm) vertically from the other surface.

(9) Effective September 2, 1997, access for employees erecting or dismantling supported scaffolds shall be in accordance with the following:

(i) The employer shall provide safe means of access for each employee erecting or dismantling a scaffold where the provision of safe access is feasible and does not create a greater hazard. The employer shall have a competent person determine whether it is feasible or would pose a greater hazard to provide, and have employees use a safe means of access. This determination shall be based on site conditions and the type of scaffold being erected or dismantled.

(ii) Hook-on or attachable ladders shall be installed as soon as scaffold erection has progressed to a point that permits safe installation and use.

(iii) When erecting or dismantling tubular welded frame scaffolds, (end) frames, with horizontal members that are parallel, level and are not more than 22 inches apart vertically may be used as

climbing devices for access, provided they are erected in a manner that creates a usable ladder and provides good hand hold and foot space.

(iv) Cross braces on tubular welded frame scaffolds shall not be used as a means of access or egress.

(f) **Use.** (1) Scaffolds and scaffold components shall not be loaded in excess of their maximum intended loads or rated capacities, whichever is less.

(2) The use of shore or lean-to scaffolds is prohibited.

(3) Scaffolds and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity.

(4) Any part of a scaffold damaged or weakened such that its strength is less than that required by paragraph (a) of this section shall be immediately repaired or replaced, braced to meet those provisions, or removed from service until repaired.

(5) Scaffolds shall not be moved horizontally while employees are on them, unless they have been designed by a registered professional engineer specifically for such movement or, for mobile scaffolds, where the provisions of §1926.452(w) are followed.

(6) The clearance between scaffolds and power lines shall be as follows: Scaffolds shall not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than as follows:

Insulated Lines Voltage	Minimum Distance	Alternatives
Less than 300 volts 300 volts to 50 kv More than 50kv	3 feet (0.9 M) 10 feet (3.1 M) 10 feet (3.1 M) plus 0.4 inches (1.0 cm) for each 1 kv over 50 kv	2 times the length of the line insulator, but never less than 10 feet (3.1 m)
Uninsulated Lines Voltage	Minimum Distance	Alternatives
Less than 50 kv More than 50kv	10 feet (3.1 M) 10 feet (3.1 M) plus 0.4 inches (1.0 cm) for each 1 kv over 50 kv	2 times the length of the line insulator, but never less than 10 feet (3.1 m)

Exception to paragraph (f)(6): Scaffolds and materials may be closer to power lines than specified above where such clearance is necessary for performance of work, and only after the utility company, or electrical system operator, has been notified of the need to work closer and the utility company, or electrical system operator, has de-energized the lines, relocated the lines, or installed

protective coverings to prevent accidental contact with the lines.

(7) Scaffolds shall be erected, moved, dismantled, or altered only under the supervision and direction of a competent person qualified in scaffold erection, moving, dismantling or alteration. Such activities shall be performed only by experienced and trained employees selected for such work by the competent person.

(8) Employees shall be prohibited from working on scaffolds covered with snow, ice, or other slippery material except as necessary for removal of such materials.

(9) Where swinging loads are being hoisted onto or near scaffolds such that the loads might contact the scaffold, tag lines or equivalent measures to control the loads shall be used.

(10) Suspension ropes supporting adjustable suspension scaffolds shall be of a diameter large enough to provide sufficient surface area for the functioning of brake and hoist mechanisms.

(11) Suspension ropes shall be shielded from heat-producing processes. When acids or other corrosive substances are used on a scaffold, the ropes shall be shielded, treated to protect against the corrosive substances, or shall be of a material that will not be damaged by the substance being used.

(12) Work on or from scaffolds is prohibited during storms or high winds unless a competent person has determined that it is safe for employees to be on the scaffold and those employees are protected by a personal fall arrest system or wind screens. Wind screens shall not be used unless the scaffold is secured against the anticipated wind forces imposed.

(13) Debris shall not be allowed to accumulate on platforms.

(14) Makeshift devices, such as but not limited to boxes and barrels, shall not be used on top of scaffold platforms to increase the working level height of employees.

(15) Ladders shall not be used on scaffolds to increase the working level height of employees, except on large area scaffolds where employers have satisfied the following criteria:

(i) When the ladder is placed against a structure which is not a part of the scaffold, the scaffold shall be secured against the sideways thrust exerted by the ladder;

(ii) The platform units shall be secured to the scaffold to prevent their movement;

(iii) The ladder legs shall be on the same platform or other means shall be provided to stabilize the ladder against unequal platform deflection, and

(iv) The ladder legs shall be secured to prevent them from slipping or being pushed off the platform.

(16) Platforms shall not deflect more than 1/60 of the span when loaded.

(17) To reduce the possibility of welding current arcing through the suspension wire rope when

performing welding from suspended scaffolds, the following precautions shall be taken, as applicable:

- (i) An insulated thimble shall be used to attach each suspension wire rope to its hanging support (such as cornice hook or outrigger). Excess suspension wire rope and any additional independent lines from grounding shall be insulated;
 - (ii) The suspension wire rope shall be covered with insulating material extending at least 4 feet (1.2 m) above the hoist. If there is a tail line below the hoist, it shall be insulated to prevent contact with the platform. The portion of the tail line that hangs free below the scaffold shall be guided or retained, or both, so that it does not become grounded;
 - (iii) Each hoist shall be covered with insulated protective covers;
 - (iv) In addition to a work lead attachment required by the welding process, a grounding conductor shall be connected from the scaffold to the structure. The size of this conductor shall be at least the size of the welding process work lead, and this conductor shall not be in series with the welding process or the work piece;
 - (v) If the scaffold grounding lead is disconnected at any time, the welding machine shall be shut off; and
 - (vi) An active welding rod or uninsulated welding lead shall not be allowed to contact the scaffold or its suspension system.
- (g) Fall protection.** (1) Each employee on a scaffold more than 10 feet (3.1 m) above a lower level shall be protected from falling to that lower level. Paragraphs (g)(1)(i) through (vii) of this section, establish the types of fall protection to be provided to the employees on each type of scaffold. Paragraph (g)(2) of this section addresses fall protection for scaffold erectors and dismantlers. NOTE to paragraph (g)(1): The fall protection requirements for employees installing suspension scaffold support systems on floors, roofs, and other elevated surfaces are set forth in subpart M of this part.
- (i) Each employee on a boatswains' chair, catenary scaffold, float scaffold, needle beam scaffold, or ladder jack scaffold shall be protected by a personal fall arrest system;
 - (ii) Each employee on a single-point or twopoint adjustable suspension scaffold shall be protected by both a personal fall arrest system and guardrail system;
 - (iii) Each employee on a crawling board (chicken ladder) shall be protected by a personal fall arrest system, a guardrail system (with minimum 200 pound toprail capacity), or by a three-fourth inch (1.9 cm) diameter grabline or equivalent handhold securely fastened beside each crawling board;
 - (iv) Each employee on a self-contained adjustable scaffold shall be protected by a guardrail system (with minimum 200 pound toprail capacity) when the platform is supported by the frame structure, and by both a personal fall arrest system and a guardrail system (with minimum 200 pound toprail

capacity) when the platform is supported by ropes;

(v) Each employee on a walkway located within a scaffold shall be protected by a guardrail system (with minimum 200 pound toprail capacity) installed within 9 1/2 inches (24.1 cm) of and along at least one side of the walkway.

(vi) Each employee performing overhand bricklaying operations from a supported scaffold shall be protected from falling from all open sides and ends of the scaffold (except at the side next to the wall being laid) by the use of a personal fall arrest system or guardrail system (with minimum 200 pound toprail capacity).

(vii) For all scaffolds not otherwise specified in paragraphs (g)(1)(i) through (g)(1)(vi) of this section, each employee shall be protected by the use of personal fall arrest systems or guardrail systems meeting the requirements of paragraph (g)(4) of this section.

(2) Effective September 2, 1997, the employer shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.

(3) In addition to meeting the requirements of §1926.502(d), personal fall arrest systems used on scaffolds shall be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member. Vertical lifelines shall not be used when overhead components, such as overhead protection or additional platform levels, are part of a single-point or two-point adjustable suspension scaffold.

(i) When vertical lifelines are used, they shall be fastened to a fixed safe point of anchorage, shall be independent of the scaffold, and shall be protected from sharp edges and abrasion. Safe points of anchorage include structural members of buildings, but do not include standpipes, vents, other piping systems, electrical conduit, outrigger beams, or counterweights.

(ii) When horizontal lifelines are used, they shall be secured to two or more structural members of the scaffold, or they may be looped around both suspension and independent suspension lines (on scaffolds so equipped) above the hoist and brake attached to the end of the scaffold. Horizontal lifelines shall not be attached only to the suspension ropes.

(iii) When lanyards are connected to horizontal lifelines or structural members on a single-point or two-point adjustable suspension scaffold, the scaffold shall be equipped with additional independent support lines and automatic locking devices capable of stopping the fall of the scaffold in the event one or both of the suspension ropes fail. The independent support lines shall be equal in number and strength to the suspension ropes.

(iv) Vertical lifelines, independent support lines, and suspension ropes shall not be attached to each other, nor shall they be attached to or use the same point of anchorage, nor shall they be attached to the same point on the scaffold or personal fall arrest system.

(4) Guardrail systems installed to meet the requirements of this section shall comply with the following provisions (guardrail systems built in accordance with Appendix A to this subpart will be deemed to meet the requirements of paragraphs (g)(4)(vii), (viii), and (ix) of this section):

(i) Guardrail systems shall be installed along all open sides and ends of platforms. Guardrail systems shall be installed before the scaffold is released for use by employees other than erection/dismantling crews.

(ii) The top edge height of top rails or equivalent member on supported scaffolds manufactured or placed in service after January 1, 2000 shall be installed between 38 inches (0.97 m) and 45 inches (1.2 m) above the platform surface. The top edge height on supported scaffolds manufactured and placed in service before January 1, 2000, and on all suspended scaffolds where both a guardrail and a personal fall arrest system are required shall be between 36 inches (0.9 m) and 45 inches (1.2 m). When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of paragraph (g)(4).

(iii) When midrails, screens, mesh, intermediate vertical members, solid panels, or equivalent structural members are used, they shall be installed between the top edge of the guardrail system and the scaffold platform.

(iv) When midrails are used, they shall be installed at a height approximately midway between the top edge of the guardrail system and the platform surface.

(v) When screens and mesh are used, they shall extend from the top edge of the guardrail system to the scaffold platform, and along the entire opening between the supports.

(vi) When intermediate members (such as balusters or additional rails) are used, they shall not be more than 19 inches (48 cm) apart.

(vii) Each top rail or equivalent member of a guardrail system shall be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along its top edge of at least 100 pounds (445 n) for guardrail systems installed on single-point adjustable suspension scaffolds or two-point adjustable suspension scaffolds, and at least 200 pounds (890 n) for guardrail systems installed on all other scaffolds.

(viii) When the loads specified in paragraph (g)(4)(vii) of this section are applied in a downward direction, the top edge shall not drop below the height above the platform surface that is prescribed in paragraph (g)(4)(ii) of this section.

(ix) Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members of a guardrail system shall be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along the midrail or other member of at least 75 pounds (333 n) for guardrail systems with a minimum 100 pound top rail capacity, and at least 150 pounds (666 n) for guardrail systems with a minimum 200 pound top rail capacity.

(x) Suspension scaffold hoists and non-walkthrough stirrups may be used as end guardrails, if the space between the hoist or stirrup and the side guardrail or structure does not allow passage of an employee to the end of the scaffold.

(xi) Guardrails shall be surfaced to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

(xii) The ends of all rails shall not overhang the terminal posts except when such overhang does not constitute a projection hazard to employees.

(xiii) Steel or plastic banding shall not be used as a toprail or midrail.

(xiv) Manila or plastic (or other synthetic) rope being used for toprails or midrails shall be inspected by a competent person as frequently as necessary to ensure that it continues to meet the strength requirements of paragraph (g) of this section.

(xv) Cross bracing is acceptable in place of a midrail when the crossing point of two braces is between 20 inches (0.5 m) and 30 inches (0.8 m) above the work platform or as a toprail when the crossing point of two braces is between 38 inches (0.97 m) and 48 inches (1.3 m) above the work platform. The end points at each upright shall be no more than 48 inches (1.3 m) apart.

(h) Falling object protection. (1) In addition to wearing hardhats each employee on a scaffold shall be provided with additional protection from falling hand tools, debris, and other small objects through the installation of toeboards, screens, or guardrail systems, or through the erection of debris nets, catch platforms, or canopy structures that contain or deflect the falling objects. When the falling objects are too large, heavy or massive to be contained or deflected by any of the above-listed measures, the employer shall place such potential falling objects away from the edge of the surface from which they could fall and shall secure those materials as necessary to prevent their falling.

(2) Where there is a danger of tools, materials, or equipment falling from a scaffold and striking employees below, the following provisions apply:

(i) The area below the scaffold to which objects can fall shall be barricaded, and employees shall not be permitted to enter the hazard area; or

(ii) A toeboard shall be erected along the edge of platforms more than 10 feet (3.1 m) above lower levels for a distance sufficient to protect employees below, except on float (ship) scaffolds where an edging of 3/4 x 1-1/2 inch (2 x 4 cm) wood or equivalent may be used in lieu of toeboards;

(iii) Where tools, materials, or equipment are piled to a height higher than the top edge of the toeboard, paneling or screening extending from the toeboard or platform to the top of the guardrail shall be erected for a distance sufficient to protect employees below, or

(iv) A guardrail system shall be installed with openings small enough to prevent passage of potential falling objects, or

(v) A canopy structure, debris net, or catch platform strong enough to withstand the impact forces of the potential falling objects shall be erected over the employees below.

(3) Canopies, when used for falling object protection, shall comply with the following criteria:

(i) Canopies shall be installed between the falling object hazard and the employees.

(ii) When canopies are used on suspension scaffolds for falling object protection, the scaffold shall be equipped with additional independent support lines equal in number to the number of points supported, and equivalent in strength to the strength of the suspension ropes.

(iii) Independent support lines and suspension ropes shall not be attached to the same points of anchorage.

(4) Where used, toeboards shall be:

(i) Capable of withstanding, without failure, a force of at least 50 pounds (222 n) applied in any downward or horizontal direction at any point along the toeboard (toeboards built in accordance with Appendix A to this subpart will be deemed to meet this requirement); and

(ii) At least three and one-half inches (9 cm) high from the top edge of the toe board to the level of the walking/working surface. Toeboards shall be securely fastened in place at the outermost edge of the platform and have not more than 1/4 inch (0.7 cm) clearance above the walking/working surface. Toeboards shall be solid or with openings not over one inch (2.5 cm) in the greatest dimension.

§1926.452 Additional requirements applicable to specific types of scaffolds.

In addition to the applicable requirements of §1926.451, the following requirements apply to the specific types of scaffolds indicated. Scaffolds not specifically addressed by §1926.452, such as but not limited to systems scaffolds, must meet the requirements of §1926.451.

(a) **Pole scaffolds.** (1) When platforms are being moved to the next level, the existing platform shall be left undisturbed until the new bearers have been set in place and braced, prior to receiving the new platforms.

(2) Crossbracing shall be installed between the inner and outer sets of poles on double pole scaffolds.

(3) Diagonal bracing in both directions shall be installed across the entire inside face of double-pole scaffolds used to support loads equivalent to a uniformly distributed load of 50 pounds (222 kg) or more per square foot (929 square cm).

(4) Diagonal bracing in both directions shall be installed across the entire outside face of all double and single-pole scaffolds.

(5) Runners and bearers shall be installed on edge.

(6) Bearers shall extend a minimum of 3 inches (7.6 cm) over the outside edges of runners.

(7) Runners shall extend over a minimum of two poles, and shall be supported by bearing blocks securely attached to the poles.

(8) Braces, bearers, and runners shall not be spliced between poles.

(9) Where wooden poles are spliced, the ends shall be squared and the upper section shall rest squarely on the lower section. Wood splice plates shall be provided on at least two adjacent sides, and shall extend at least 2 feet (0.6 m) on either side of the splice, overlap the abutted ends equally, and have at least the same cross-sectional areas as the pole. Splice plates of other materials of equivalent strength may be used.

(10) Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer, and shall be constructed and loaded in accordance with that design. Non-mandatory Appendix A to this subpart contains examples of criteria that will enable an employer to comply with design and loading requirements for pole scaffolds under 60 feet in height.

(b) **Tube and coupler scaffolds.** (1) When platforms are being moved to the next level, the existing platform shall be left undisturbed until the new bearers have been set in place and braced prior to receiving the new platforms.

(2) Transverse bracing forming an "X" across the width of the scaffold shall be installed at the scaffold ends and at least at every third set of posts horizontally (measured from only one end) and every fourth runner vertically. Bracing shall extend diagonally from the inner or outer posts or runners upward to the next outer or inner posts or runners. Building ties shall be installed at the bearer levels between the transverse bracing and shall conform the requirements of §1926.451(c) (1).

(3) On straight run scaffolds, longitudinal bracing across the inner and outer rows of posts shall be installed diagonally in both directions, and shall extend from the base of the end posts upward to the top of the scaffold at approximately a 45 degree angle. On scaffolds whose length is greater than their height, such bracing shall be repeated beginning at least at every fifth post. On scaffolds whose length is less than their height, such bracing shall be installed from the base of the end posts upward to the opposite end posts, and then in alternating directions until reaching the top of the scaffold. Bracing shall be installed as close as possible to the intersection of the bearer and post runner and post.

(4) Where conditions preclude the attachment of bracing to posts, bracing shall be attached to the runners as close to the post as possible.

(5) Bearers shall be installed transversely between posts, and when coupled to the posts, shall have the inboard coupler bear directly on the runner coupler. When the bearers are coupled to the runners,

the couplers shall be as close to the posts as possible.

(6) Bearers shall extend beyond the posts and runners, and shall provide full contact with the coupler.

(7) Runners shall be installed along the length of the scaffold, located on both the inside and outside posts at level heights (when tube and coupler guardrails and midrails are used on outside posts, they may be used in lieu of outside runners).

(8) Runners shall be interlocked on straight runs to form continuous lengths, and shall be coupled to each post. The bottom runners and bearers shall be located as close to the base as possible.

(9) Couplers shall be of a structural metal, such as drop-forged steel, malleable iron, or structural grade aluminum. The use of gray cast iron is prohibited.

(10) Tube and coupler scaffolds over 125 feet in height shall be designed by a registered professional engineer, and shall be constructed and loaded in accordance with such design. Non-mandatory Appendix A to this subpart contains examples of criteria that will enable an employer to comply with design and loading requirements for tube and coupler scaffolds under 125 feet in height.

(c) Fabricated frame scaffolds (tubular welded frame scaffolds).

(1) When moving platforms to the next level, the existing platform shall be left undisturbed until the new end frames have been set in place and braced prior to receiving the new platforms.

(2) Frames and panels shall be braced by cross, horizontal, or diagonal braces, or combination thereof, which secure vertical members together laterally. The cross braces shall be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, level, and square. All brace connections shall be secured.

(3) Frames and panels shall be joined together vertically by coupling or stacking pins or equivalent means.

(4) Where uplift can occur which would displace scaffold end frames or panels, the frames or panels shall be locked together vertically by pins or equivalent means.

(5) Brackets used to support cantilevered loads shall:

(i) be seated with side-brackets parallel to the frames and end-brackets at 90 degrees to the frames;

(ii) not be bent or twisted from these positions; and

(iii) be used only to support personnel, unless the scaffold has been designed for other loads by a qualified engineer and built to withstand the tipping forces caused by those other loads being placed on the bracket-supported section of the scaffold.

(6) Scaffolds over 125 feet (38.0 m) in height above their base plates shall be designed by a registered professional engineer, and shall be constructed and loaded in accordance with such design.

(d) **Plasterers', decorators', and large area scaffolds.** Scaffolds shall be constructed in accordance with paragraphs (a), (b), or (c) of this section, as appropriate.

(e) **Bricklayers' square scaffolds (squares).** (1) Scaffolds made of wood shall be reinforced with gussets on both sides of each corner.

(2) Diagonal braces shall be installed on all sides of each square.

(3) Diagonal braces shall be installed between squares on the rear and front sides of the scaffold, and shall extend from the bottom of each square to the top of the next square.

(4) Scaffolds shall not exceed three tiers in height, and shall be so constructed and arranged that one square rests directly above the other. The upper tiers shall stand on a continuous row of planks laid across the next lower tier, and shall be nailed down or otherwise secured to prevent displacement.

(f) **Horse scaffolds.** (1) Scaffolds shall not be constructed or arranged more than two tiers or 10 feet (3.0 m) in height, whichever is less.

(2) When horses are arranged in tiers, each horse shall be placed directly over the horse in the tier below.

(3) When horses are arranged in tiers, the legs of each horse shall be nailed down or otherwise secured to prevent displacement.

(4) When horses are arranged in tiers, each tier shall be crossbraced.

(g) **Form scaffolds and carpenters' bracket scaffolds.**

(1) Each bracket, except those for wooden bracket-form scaffolds, shall be attached to the supporting formwork or structure by means of one or more of the following: nails; a metal stud attachment device; welding; hooking over a secured structural supporting member, with the form wales either bolted to the form or secured by snap ties or tie bolts extending through the form and securely anchored; or, for carpenters' bracket scaffolds only, by a bolt extending through to the opposite side of the structure's wall.

(2) Wooden bracket-form scaffolds shall be an integral part of the form panel.

(3) Folding type metal brackets, when extended for use, shall be either bolted or secured with a locking-type pin.

(h) **Roof bracket scaffolds.** (1) Scaffold brackets shall be constructed to fit the pitch of the roof and

shall provide a level support for the platform.

(2) Brackets (including those provided with pointed metal projections) shall be anchored in place by nails unless it is impractical to use nails. When nails are not used, brackets shall be secured in place with first-grade manila rope of at least three-fourth inch (1.9 cm) diameter, or equivalent.

(i) **Outrigger scaffolds.** (1) The inboard end of outrigger beams, measured from the fulcrum point to the extreme point of anchorage, shall be not less than one and one-half times the outboard end in length.

(2) Outrigger beams fabricated in the shape of an I-beam or channel shall be placed so that the web section is vertical.

(3) The fulcrum point of outrigger beams shall rest on secure bearings at least 6 inches (15.2 cm) in each horizontal dimension.

(4) Outrigger beams shall be secured in place against movement, and shall be securely braced at the fulcrum point against tipping.

(5) The inboard ends of outrigger beams shall be securely anchored either by means of braced struts bearing against sills in contact with the overhead beams or ceiling, or by means of tension members secured to the floor joists underfoot, or by both.

(6) The entire supporting structure shall be securely braced to prevent any horizontal movement.

(7) To prevent their displacement, platform units shall be nailed, bolted, or otherwise secured to outriggers.

(8) Scaffolds and scaffold components shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with such design.

(j) **Pump jack scaffolds.** (1) Pump jack brackets, braces, and accessories shall be fabricated from metal plates and angles. Each pump jack bracket shall have two positive gripping mechanisms to prevent any failure or slippage.

(2) Poles shall be secured to the structure by rigid triangular bracing or equivalent at the bottom, top, and other points as necessary. When the pump jack has to pass bracing already installed, an additional brace shall be installed approximately 4 feet (1.2 m) above the brace to be passed, and shall be left in place until the pump jack has been moved and the original brace reinstalled.

(3) When guardrails are used for fall protection, a workbench may be used as the toprail only if it meets all the requirements in paragraphs (g)(4)(ii), (vii), (viii), and (xiii) of §1926.451.

(4) Work benches shall not be used as scaffold platforms.

(5) When poles are made of wood, the pole lumber shall be straight-grained, free of shakes, large

loose or dead knots, and other defects which might impair strength.

(6) When wood poles are constructed of two continuous lengths, they shall be joined together with the seam parallel to the bracket.

(7) When two by fours are spliced to make a pole, mending plates shall be installed at all splices to develop the full strength of the member.

(k) Ladder jack scaffolds. (1) Platforms shall not exceed a height of 20 feet (6.1 m).

(2) All ladders used to support ladder jack scaffolds shall meet the requirements of subpart X of this part -- Stairways and Ladders, except that job-made ladders shall not be used to support ladder jack scaffolds.

(3) The ladder jack shall be so designed and constructed that it will bear on the side rails and ladder rungs or on the ladder rungs alone. If bearing on rungs only, the bearing area shall include a length of at least 10 inches (25.4 cm) on each rung.

(4) Ladders used to support ladder jacks shall be placed, fastened, or equipped with devices to prevent slipping.

(5) Scaffold platforms shall not be bridged one to another.

(l) Window jack scaffolds. (1) Scaffolds shall be securely attached to the window opening.

(2) Scaffolds shall be used only for the purpose of working at the window opening through which the jack is placed.

(3) Window jacks shall not be used to support planks placed between one window jack and another, or for other elements of scaffolding.

(m) Crawling boards (chicken ladders). (1) Crawling boards shall extend from the roof peak to the eaves when used in connection with roof construction, repair, or maintenance.

(2) Crawling boards shall be secured to the roof by ridge hooks or by means that meet equivalent criteria (e.g., strength and durability).

(n) Step, platform, and trestle ladder scaffolds. (1) Scaffold platforms shall not be placed any higher than the second highest rung or step of the ladder supporting the platform.

(2) All ladders used in conjunction with step, platform and trestle ladder scaffolds shall meet the pertinent requirements of subpart X of this part -- Stairways and Ladders, except that job-made ladders shall not be used to support such scaffolds.

(3) Ladders used to support step, platform, and trestle ladder scaffolds shall be placed, fastened, or equipped with devices to prevent slipping.

(4) Scaffolds shall not be bridged one to another.

(o) **Single-point adjustable suspension scaffolds.** (1) When two single-point adjustable suspension scaffolds are combined to form a two-point adjustable suspension scaffold, the resulting two-point scaffold shall comply with the requirements for two-point adjustable suspension scaffolds in paragraph (p) of this section.

(2) The supporting rope between the scaffold and the suspension device shall be kept vertical unless all of the following conditions are met:

(i) The rigging has been designed by a qualified person, and

(ii) The scaffold is accessible to rescuers, and

(iii) The supporting rope is protected to ensure that it will not chafe at any point where a change in direction occurs, and

(iv) The scaffold is positioned so that swinging cannot bring the scaffold into contact with another surface.

(3) Boatswains' chair tackle shall consist of correct size ball bearings or bushed blocks containing safety hooks and properly "eye-spliced" minimum five-eighth (5/8) inch (1.6 cm) diameter firstgrade manila rope, or other rope which will satisfy the criteria (e.g., strength and durability) of manila rope.

(4) Boatswains' chair seat slings shall be reeved through four corner holes in the seat; shall cross each other on the underside of the seat; and shall be rigged so as to prevent slippage which could cause an out-of-level condition.

(5) Boatswains' chair seat slings shall be a minimum of five-eighth (5/8) inch (1.6 cm) diameter fiber, synthetic, or other rope which will satisfy the criteria (e.g., strength, slip resistance, durability, etc.) of first grade manila rope.

(6) When a heat-producing process such as gas or arc welding is being conducted, boatswains' chair seat slings shall be a minimum of three-eighth (3/8) inch (1.0 cm) wire rope.

(7) Non-cross-laminated wood boatswains' chairs shall be reinforced on their underside by cleats securely fastened to prevent the board from splitting.

(p) **Two-point adjustable suspension scaffolds (swing stages).** The following requirements do not apply to two-point adjustable suspension scaffolds used as masons' or stonemasons' scaffolds. Such scaffolds are covered by paragraph (q) of this section.

(1) Platforms shall not be more than 36 inches (0.9 m) wide unless designed by a qualified person to prevent unstable conditions.

(2) The platform shall be securely fastened to hangers (stirrups) by U-bolts or by other means which satisfy the requirements of §1926.451(a).

(3) The blocks for fiber or synthetic ropes shall consist of at least one double and one single block. The sheaves of all blocks shall fit the size of the rope used.

(4) Platforms shall be of the ladder-type, plank-type, beam-type, or light-metal type. Light metal-type platforms having a rated capacity of 750 pounds or less and platforms 40 feet (12.2 m) or less in length shall be tested and listed by a nationally recognized testing laboratory.

(5) Two-point scaffolds shall not be bridged or otherwise connected one to another during raising and lowering operations unless the bridge connections are articulated (attached), and the hoists properly sized.

(6) Passage may be made from one platform to another only when the platforms are at the same height, are abutting, and walk-through stirrups specifically designed for this purpose are used.

(q) Multi-point adjustable suspension scaffolds, stonemasons' multi-point adjustable suspension scaffolds, and masons' multi-point adjustable suspension scaffolds.

(1) When two or more scaffolds are used they shall not be bridged one to another unless they are designed to be bridged, the bridge connections are articulated, and the hoists are properly sized.

(2) If bridges are not used, passage may be made from one platform to another only when the platforms are at the same height and are abutting.

(3) Scaffolds shall be suspended from metal outriggers, brackets, wire rope slings, hooks, or means that meet equivalent criteria (e.g., strength, durability).

(r) Catenary scaffolds. (1) No more than one platform shall be placed between consecutive vertical pickups, and no more than two platforms shall be used on a catenary scaffold.

(2) Platforms supported by wire ropes shall have hook-shaped stops on each end of the platforms to prevent them from slipping off the wire ropes. These hooks shall be so placed that they will prevent the platform from falling if one of the horizontal wire ropes breaks.

(3) Wire ropes shall not be tightened to the extent that the application of a scaffold load will overstress them.

(4) Wire ropes shall be continuous and without splices between anchors.

(s) Float (ship) scaffolds. (1) The platform shall be supported by a minimum of two bearers, each of which shall project a minimum of 6 inches (15.2 cm) beyond the platform on both sides. Each bearer shall be securely fastened to the platform.

(2) Rope connections shall be such that the platform cannot shift or slip.

(3) When only two ropes are used with each float:

(i) They shall be arranged so as to provide four ends which are securely fastened to overhead supports.

(ii) Each supporting rope shall be hitched around one end of the bearer and pass under the platform to the other end of the bearer where it is hitched again, leaving sufficient rope at each end for the supporting ties.

(t) **Interior hung scaffolds.** (1) Scaffolds shall be suspended only from the roof structure or other structural member such as ceiling beams.

(2) Overhead supporting members (roof structure, ceiling beams, or other structural members) shall be inspected and checked for strength before the scaffold is erected.

(3) Suspension ropes and cables shall be connected to the overhead supporting members by shackles, clips, thimbles, or other means that meet equivalent criteria (e.g., strength, durability).

(u) **Needle beam scaffolds.** (1) Scaffold support beams shall be installed on edge.

(2) Ropes or hangers shall be used for supports, except that one end of a needle beam scaffold may be supported by a permanent structural member.

(3) The ropes shall be securely attached to the needle beams.

(4) The support connection shall be arranged so as to prevent the needle beam from rolling or becoming displaced.

(5) Platform units shall be securely attached to the needle beams by bolts or equivalent means. Cleats and overhang are not considered to be adequate means of attachment.

(v) **Multi-level suspended scaffolds.** (1) Scaffolds shall be equipped with additional independent support lines, equal in number to the number of points supported, and of equivalent strength to the suspension ropes, and rigged to support the scaffold in the event the suspension rope(s) fail.

(2) Independent support lines and suspension ropes shall not be attached to the same points of anchorage.

(3) Supports for platforms shall be attached directly to the support stirrup and not to any other platform.

(w) **Mobile scaffolds.** (1) Scaffolds shall be braced by cross, horizontal, or diagonal braces, or combination thereof, to prevent racking or collapse of the scaffold and to secure vertical members together laterally so as to automatically square and align the vertical members. Scaffolds shall be

plumb, level, and squared. All brace connections shall be secured.

(i) Scaffolds constructed of tube and coupler components shall also comply with the requirements of paragraph (b) of this section;

(ii) Scaffolds constructed of fabricated frame components shall also comply with the requirements of paragraph (c) of this section.

(2) Scaffold casters and wheels shall be locked with positive wheel and/or wheel and swivel locks, or equivalent means, to prevent movement of the scaffold while the scaffold is used in a stationary manner.

(3) Manual force used to move the scaffold shall be applied as close to the base as practicable, but not more than 5 feet (1.5 m) above the supporting surface.

(4) Power systems used to propel mobile scaffolds shall be designed for such use. Forklifts, trucks, similar motor vehicles or add-on motors shall not be used to propel scaffolds unless the scaffold is designed for such propulsion systems.

(5) Scaffolds shall be stabilized to prevent tipping during movement.

(6) Employees shall not be allowed to ride on scaffolds unless the following conditions exist:

(i) The surface on which the scaffold is being moved is within 3 degrees of level, and free of pits, holes, and obstructions;

(ii) The height to base width ratio of the scaffold during movement is two to one or less, unless the scaffold is designed and constructed to meet or exceed nationally recognized stability test requirements such as those listed in paragraph (x) of Appendix A to this subpart (ANSI/SIA A92.5 and A92.6);

(iii) Outrigger frames, when used, are installed on both sides of the scaffold;

(iv) When power systems are used, the propelling force is applied directly to the wheels, and does not produce a speed in excess of 1 foot per second (.3 mps); and

(v) No employee is on any part of the scaffold which extends outward beyond the wheels, casters, or other supports.

(7) Platforms shall not extend outward beyond the base supports of the scaffold unless outrigger frames or equivalent devices are used to ensure stability.

(8) Where leveling of the scaffold is necessary, screw jacks or equivalent means shall be used.

(9) Caster stems and wheel stems shall be pinned or otherwise secured in scaffold legs or adjustment screws.

(10) Before a scaffold is moved, each employee on the scaffold shall be made aware of the move.

(x) **Repair bracket scaffolds.** (1) Brackets shall be secured in place by at least one wire rope at least 1/2 inch (1.27 cm) in diameter.

(2) Each bracket shall be attached to the securing wire rope (or ropes) by a positive locking device capable of preventing the unintentional detachment of the bracket from the rope, or by equivalent means.

(3) Each bracket, at the contact point between the supporting structure and the bottom of the bracket, shall be provided with a shoe (heel block or foot) capable of preventing the lateral movement of the bracket.

(4) Platforms shall be secured to the brackets in a manner that will prevent the separation of the platforms from the brackets and the movement of the platforms or the brackets on a completed scaffold.

(5) When a wire rope is placed around the structure in order to provide a safe anchorage for personal fall arrest systems used by employees erecting or dismantling scaffolds, the wire rope shall meet the requirements of subpart M of this part, but shall be at least 5/16 inch (0.8 cm) in diameter.

(6) Each wire rope used for securing brackets in place or as an anchorage for personal fall arrest systems shall be protected from damage due to contact with edges, corners, protrusions, or other discontinuities of the supporting structure or scaffold components.

(7) Tensioning of each wire rope used for securing brackets in place or as an anchorage for personal fall arrest systems shall be by means of a turnbuckle at least 1 inch (2.54 cm) in diameter, or by equivalent means.

(8) Each turnbuckle shall be connected to the other end of its rope by use of an eyesplice thimble of a size appropriate to the turnbuckle to which it is attached.

(9) U-bolt wire rope clips shall not be used on any wire rope used to secure brackets or to serve as an anchor for personal fall arrest systems.

(10) The employer shall ensure that materials shall not be dropped to the outside of the supporting structure.

(11) Scaffold erection shall progress in only one direction around any structure.

(y) **Stilts**

Stilts, when used, shall be used in accordance with the following requirements:

(1) An employee may wear stilts on a scaffold only if it is a large area scaffold.

(2) When an employee is using stilts on a large area scaffold where a guardrail system is used to provide fall protection, the guardrail system shall be increased in height by an amount equal to the height of the stilts being used by the employee.

(3) Surfaces on which stilts are used shall be flat and free of pits, holes and obstructions, such as debris, as well as other tripping and falling hazards.

(4) Stilts shall be properly maintained. Any alteration of the original equipment shall be approved by the manufacturer.

1926.453 Aerial lifts.

(a) **General requirements.** (1) Unless otherwise provided in this section, aerial lifts acquired for use on or after January 22, 1973 shall be designed and constructed in conformance with the applicable requirements of the American National Standards for "Vehicle Mounted Elevating and Rotating Work Platforms," ANSI A92.2-1969, including appendix. Aerial lifts acquired before January 22, 1973, which do not meet the requirements of ANSI A92.2-1969, may not be used after January 1, 1976, unless they shall have been modified so as to conform with the applicable design and construction requirements of ANSI A92.2-1969. Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to job-sites above ground: (i) Extensible boom platforms; (ii) aerial ladders; (iii) articulating boom platforms; (iv) vertical towers; and (v) a combination of any of this equipment. Aerial equipment may be made of metal, wood, fiberglass reinforced plastic (FRP), or other material; may be powered or manually operated; and are deemed to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis.

(2) Aerial lifts may be "field modified" for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1969 and this section and to be at least as safe as the equipment was before modification.

(b) **Specific requirements.** (1) Ladder trucks and tower trucks. Aerial ladders shall be secured in the lower traveling position by the locking device on top of the truck cab, and the manually operated device at the base of the ladder before the truck is moved for highway travel.

(2) Extensible and articulating boom platforms. (i) Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition.

(ii) Only authorized persons shall operate an aerial lift.

(iii) Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted.

(iv) Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

(v) A body belt shall be worn and a lanyard attached to the boom or basket when working from an aerial lift.

(vi) Boom and basket load limits specified by the manufacturer shall not be exceeded.

(vii) The brakes shall be set and when outriggers are used, they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed.

(viii) An aerial lift truck shall not be moved when the boom is elevated in a working position with men in the basket, except for equipment which is specifically designed for this type of operation in accordance with the provisions of paragraphs (a)(1) and (2) of this section.

(ix) Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency.

(x) Climbers shall not be worn while performing work from an aerial lift.

(xi) The insulated portion of an aerial lift shall not be altered in any manner that might reduce its insulating value.

(xii) Before moving an aerial lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position except as provided in paragraph (b)(2)(viii) of this section.

(3) Electrical tests. All electrical tests shall conform to the requirements of ANSI A92.2-1969 section 5. However equivalent d.c. voltage tests may be used in lieu of the a.c. voltage specified in A92.2-1969; d.c. voltage tests which are approved by the equipment manufacturer or equivalent entity shall be considered an equivalent test for the purpose of this paragraph (b)(3).

(4) Bursting safety factor. The provisions of the American National Standards Institute standard ANSI A92.2-1969, section 4.9 Bursting Safety Factor shall apply to all critical hydraulic and pneumatic components. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical components shall have a bursting safety factor of at least 2 to 1.

(5) Welding standards. All welding shall conform to the following standards as applicable:

(i) Standard Qualification Procedure, AWS B 3.0-41.

(ii) Recommended Practices for Automotive Welding Design, AWS D8.4-61.

(iii) Standard Qualification of Welding Procedures and Welders for Piping and Tubing, AWS D10.9-69.

(iv) Specifications for Welding Highway and Railway Bridges, AWS D2.0-69.

NOTE to §1926.453: Non-mandatory Appendix C to this subpart lists examples of national consensus standards that are considered to provide employee protection equivalent to that provided through the application of ANSI A92.2-1969, where appropriate. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American National Standards Institute. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW., room N2634, Washington, DC or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

§1926.454 Training requirements.

This section supplements and clarifies the requirements of §1926.21(b)(2) as these relate to the hazards of work on scaffolds.

(a) The employer shall have each employee who performs work while on a scaffold trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training shall include the following areas, as applicable:

- (1) The nature of any electrical hazards, fall hazards and falling object hazards in the work area;
- (2) The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used;
- (3) The proper use of the scaffold, and the proper handling of materials on the scaffold;
- (4) The maximum intended load and the load-carrying capacities of the scaffolds used; and
- (5) Any other pertinent requirements of this subpart.

(b) The employer shall have each employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold trained by a competent person to recognize any hazards associated with the work in question. The training shall include the following topics, as applicable:

- (1) The nature of scaffold hazards;
- (2) The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in question;
- (3) The design criteria, maximum intended load-carrying capacity and intended use of the scaffold;

(4) Any other pertinent requirements of this subpart.

(c) When the employer has reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, the employer shall retrain each such employee so that the requisite proficiency is regained. Retraining is required in at least the following situations:

(1) Where changes at the worksite present a hazard about which an employee has not been previously trained; or

(2) Where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained; or

(3) Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.

Non-Mandatory Appendices

Non-mandatory Appendix A to Subpart L -- Scaffold Specifications

This Appendix provides non-mandatory guidelines to assist employers in complying with the requirements of subpart L of this part. An employer may use these guidelines and tables as a starting point for designing scaffold systems. However, the guidelines do not provide all the information necessary to build a complete system, and the employer is still responsible for designing and assembling these components in such a way that the completed system will meet the requirements of §1926.451(a). Scaffold components which are not selected and loaded in accordance with this Appendix, and components for which no specific guidelines or tables are given in this Appendix (e.g., joints, ties, components for wood pole scaffolds more than 60 feet in height, components for heavy duty horse scaffolds, components made with other materials, and components with other dimensions, etc.) must be designed and constructed in accordance with the capacity requirements of §1926.451(a), and loaded in accordance with §1926.451(d)(1).

Index to Appendix A for Subpart L

1. General guidelines and tables.
2. Specific guidelines and tables.
 - (a) Pole scaffolds: Single-pole wood pole scaffolds. Independent wood pole scaffolds.
 - (c) Fabricated frame scaffolds.
 - (d) Plasterers', decorators' and large area scaffolds.
 - (e) Bricklayers' square scaffolds.
 - (f) Horse scaffolds.
 - (g) Form scaffolds and carpenters' bracket
 - (h) Roof bracket scaffolds.
 - (i) Outrigger scaffolds (one level).
 - (j) Pump jack scaffolds.

- (l) Window jack scaffolds.
- (m) Crawling boards (chicken ladders).
- (n) Step, platform and trestle ladder scaffolds.
- (o) Single-point adjustable suspension scaffolds.
- (p) Two-point adjustable suspension scaffolds.
- (q)(1) Stonesetters' multi-point adjustable suspension scaffolds.
- (q)(2) Masons' multi-point adjustable suspension scaffolds.
- (r) Catenary scaffolds.
- (s) Float (ship) scaffolds.
- (t) Interior hung scaffolds.
- (u) Needle beam scaffolds.
- (v) Multi-level suspension scaffolds.
- (w) Mobile scaffolds.
- (x) Repair bracket scaffolds.
- (y) Stilts.
- (z) Tank builders' scaffolds.

1. General guidelines and tables.

(a) The following tables, and the tables in Part 2 -- Specific guidelines and tables, assume that all load-carrying timber members (except planks) of the scaffold are a minimum of 1,500 lb-f/in² (stress grade) construction grade lumber. All dimensions are nominal sizes as provided in the American Softwood Lumber Standards, dated January 1970, except that, where rough sizes are noted, only rough or undressed lumber of the size specified will satisfy minimum requirements.

(b) Solid sawn wood used as scaffold planks shall be selected for such use following the grading rules established by a recognized lumber grading association or by an independent lumber grading inspection agency. Such planks shall be identified by the grade stamp of such association or agency. The association or agency and the grading rules under which the wood is graded shall be certified by the Board of Review, American Lumber Standard Committee, as set forth in the American Softwood Lumber Standard of the U.S. Department of Commerce.

Allowable spans shall be determined in compliance with the National Design Specification for Wood Construction published by the National Forest Products Association; paragraph 5 of ANSI A10.8-1988 Scaffolding-Safety Requirements published by the American National Standards Institute; or for 2 x 10 inch (nominal) or 2 x 9 inch (rough) solid sawn wood planks, as shown in the following table:

Maximum Intended Nominal Load (lb/ft)	Maximum Permissible Span Using Full Thickness Undressed Lumber (ft)	Maximum Permissible Span Using Nominal Thickness Lumber (ft)
25	10	8
50	8	6
75	6	—

The maximum permissible span for 1-1/4 x 9-inch or wider wood plank of full thickness with a maximum intended load of 50 lb/ft² shall be 4 feet.

(c) Fabricated planks and platforms may be used in lieu of solid sawn wood planks. Maximum spans for such units shall be as recommended by the manufacturer based on the maximum intended load being calculated as follows:

Rated Load Capacity	Intended Load
Light-duty	•25 pounds per square foot applied uniformly over the entire span area.
Medium-duty	•50 pounds per square foot applied uniformly over the entire span area.
Heavy-duty	•75 pounds per square foot applied uniformly over the entire span area.
One-person	•250 pounds placed at the center of the span (total 250 pounds).
Two-person	•250 pounds placed 18 inches to the left and right of the center of the span (total 500 pounds).
Three-person	•250 pounds placed at the center of the span and 250 pounds placed 18 inches to the left and right of the center of the span (total 750 pounds).

NOTE: Platform units used to make scaffold platforms intended for light-duty use shall be capable of supporting at least 25 pounds per square foot applied uniformly over the entire unit-span area, or a 250-pound point load placed on the unit at the center of the span, whichever load produces the greater shear force.

(d) Guardrails shall be as follows:

(i) Toprails shall be equivalent in strength to 2 inch by 4 inch lumber; or 1-1/4 inch x 1/8 inch structural angle iron; or 1 inch x .070 inch wall steel tubing; or 1.990 inch x .058 inch wall aluminum tubing.

(ii) Midrails shall be equivalent in strength to 1 inch by 6 inch lumber; or 1-1/4 inch x 1-1/4 inch x 1/8 inch structural angle iron; or 1 inch x .070 inch wall steel tubing; or 1.990 inch x .058 inch wall aluminum tubing.

(iii) Toeboards shall be equivalent in strength to 1 inch by 4 inch lumber; or 1-1/4 inch x 1-1/4 inch structural angle iron; or 1 inch x .070 inch wall steel tubing; or 1.990 inch x .058 inch wall aluminum tubing.

(iv) Posts shall be equivalent in strength to 2 inch by 4 inch lumber; or 1-1/4 inch x 1-1/4 inch x 1/8 inch structural angle iron; or 1 inch x .070 inch wall steel tubing; or 1.990 inch x .058 inch wall aluminum tubing.

(v) Distance between posts shall not exceed 8 feet.

(e) Overhead protection shall consist of 2 inch nominal planking laid tight, or 3/4-inch plywood.

(f) Screen installed between toeboards and midrails or top rails shall consist of No. 18 gauge U.S. Standard wire one inch mesh.

2. Specific guidelines and tables.

(a) *Pole Scaffolds.*

Single Pole Wood Pole Scaffolds

	Light Duty up to 20 feet High	Light Duty up to 60 feet High	Medium Duty up to 60 feet High	Heavy Duty up to 60 feet High
Maximum intended load	25 lbs/ft	25 lbs/ft	50 lbs/ft	75 lbs/ft
Poles or uprights	2 x 4 in.	4 x 4 in.	4 x 4 in.	4 x 6 in.
Maximum pole spacing (longitudinal)	6 feet	10 feet	8 feet	6 feet
Maximum pole spacing (transverse)	5 feet	5 feet	5 feet	5 feet
Runners	1 x 4 in.	1-1/4 x 9 in.	2 x 10 in.	2 x 10 in.
Bearers and maximum spacing of bearers:				
3 feet	2 x 4 in.	2 x 4 in.	2 x 10 in. or 3 x 4 in.	2 x 10 in. or 3 x 5 in.
5 feet	2 x 6 in. or 3 x 4 in.	2 x 6 in. or 3 x 4 in. (rough)	2 x 10 in. or 3 x 4 in.	2 x 10 in. or 3 x 5 in.
6 feet	—	—	2 x 10 in. or 3 x 4 in.	2 x 10 in. or 3 x 5 in.
8 feet	—	—	2 x 10 in. or 3 x 4 in.	—
Planking	1-1/4 x 9 in.	2 x 10 in.	2 x 10 in.	2 x 10 in.

Maximum vertical spacing of horizontal members	7 feet	9 feet	7 feet	6 ft. 6 in.
Bracing horizontal	1 x 4 in.	1 x 4 in.	1 x 6 in. or 1-1/4 x 4 in.	2 x 4 in.
Bracing diagonal	1 x 4 in.	1 x 4 in.	1 x 4 in.	2 x 4 in.
Tie-ins	1 x 4 in.	1 x 4 in.	1 x 4 in.	1 x 4 in.

NOTE: All members except planking are used on edge. All wood bearers shall be reinforced with 3/16 x 2 inch steel strip, or the equivalent, secured to the lower edges for the entire length of the bearer.

Independent Wood Pole Scaffolds

	Light Duty up to 20 feet High	Light Duty up to 60 feet High	Medium Duty up to 60 feet High	Heavy Duty up to 60 feet High
Maximum intended load	25 lbs/ft	25 lbs/ft	50 lbs/ft	75 lbs/ft
Poles or uprights	2 x 4 in.	4 x 4 in.	4 x 4 in.	4 x 4 in.
Maximum pole spacing (longitudinal)	6 feet	10 feet	8 feet	6 feet
Maximum (transverse)	6 feet	10 feet	8 feet	8 feet
Runners	1-1/4 x 4 in.	1-1/4 x 9 in.	2 x 10 in.	2 x 10 in.
Bearers and maximum spacing of bearers:				
3 feet	2 x 4 in.	2 x 4 in.	2 x 10 in.	2 x 10 in. (rough)
6 feet	2 x 6 in. or 3 x 4 in.	2 x 10 in. (rough) or 3 x 8 in.	2 X 10 in.	2 x 10 in. or (rough)
8 feet	2 x 6 in. or 3 x 4 in.	2 x 10 in. (rough) or 3 x 8 in.	2 x 10 in.	—

10 feet	2 x 6 in. or 3 x 4 in.	2 x 10 in. (rough) or 3 x 3 in.	—	—
Planking	1-1/4 x 9 in.	2 x 10 in.	2 x 10 in.	2 x 10 in.
Maximum vertical spacing of horizontal members	7 feet	7 feet	6 feet	6 feet
Bracing horizontal	1 x 4 in.	1 x 4 in.	1 x 6 in. or 1-1/4 x 4 in.	2 x 4 in.
Bracing diagonal	1 x 4 in.	1 x 4 in.	1 x 4 in.	2 x 4 in.
Tie-ins	1 x 4 in.	1 x 4 in.	1 x 4 in.	1 x 4 in.

NOTE: All members except planking are used on edge. All wood bearers shall be reinforced with 3/16 x 2 inch steel strip, or the equivalent, secured to the lower edges for the entire length of the bearer.

(b) Tube and coupler scaffolds.

Minimum Size of Members

	Light Duty	Medium Duty	Heavy Duty
Maximum intended load	25 lbs/ft	50 lbs/ft	75 lbs/ft
Posts, runners, and braces	Nominal 2 in. (1.90 inches) OD steel tube or pipe	Nominal 2 in. (1.90 inches) OD steel tube or pipe	Nominal 2 in. (1.90 inches) OD steel tube or pipe

Bearers	Nominal 2 in. (1.90 inches) OD steel tube or pipe and a maximum post spacing of 4 ft. x 10 ft.*	Nominal 2 in. (1.90 inches) OD steel tube or pipe and a maximum post spacing of 4 ft. x 7 ft. or Nominal 2-1/2 in. (2.375 in.) OD steel tube or pipe and a maximum post spacing of 6 ft. x 8 ft.*	Nominal 2-1/2 in. (2.375 in.) OD steel tube or pipe and a maximum post spacing of 6 ft. x 6 ft.
Maximum runner spacing vertically	6 ft. 6 in.	6 ft. 6 in.	6 ft. 6 in.

*Bearers shall be installed in the direction of the shorter dimension.

NOTE: Longitudinal diagonal bracing shall be installed at an angle of 45o (± 5o).

	<i>Maximum Number of Additional Planked Levels</i>			<i>Maximum Height of Scaffold (in feet)</i>
	Light Duty	Medium Duty	Heavy Duty	
Number of Working Levels				
1	16	11	6	125
2	11	1	0	125
3	6	0	0	125
4	1	0	0	125

(c) *Fabricated frame scaffolds.* Because of their prefabricated nature, no additional guidelines or tables for these scaffolds are being adopted in this Appendix.

(d) *Plasterers', decorators', and large area scaffolds.* The guidelines for pole scaffolds or tube and coupler scaffolds (Appendix A(a) and (b)) may be applied.

(e) *Bricklayers' square scaffolds.*

Maximum intended load 50 lb/ft 2*

Maximum width 5 ft

Maximum height 5 ft

Gussets 1 x 6 in
 Braces 1 x 8 in
 Legs 2 x 6 in
 Bearers (horizontal members) 2 x 6 in

*The squares shall be set not more than 8 feet apart for light duty scaffolds and not more than 5 feet apart for medium duty scaffolds.

(f) *Horse scaffolds.*

Maximum intended load (light duty) 25 lb/ft 2*

Maximum intended load (medium duty) 50 lb/ft 2*

Horizontal members or bearers:

Light duty 2 x 4 in

Medium duty 3 x 4 in

Legs 2 x 4 in

Longitudinal brace between legs 1 x 6 in

Gusset brace at top of legs 1 x 8 in

Half diagonal braces 2 x 4 in

*Horses shall be spaced not more than 8 feet apart for light duty loads, and not more than 5 feet apart for medium duty loads.

(g) *Form scaffolds and carpenters' bracket scaffolds.*

(1) Brackets shall consist of a triangular-shaped frame made of wood with a cross-section not less than 2 inches by 3 inches, or of 1-1/4 inch x 1-1/4 inch x 1/8 inch structural angle iron.

(2) Bolts used to attach brackets to structures shall not be less than 5/8 inches in diameter.

(3) Maximum bracket spacing shall be 8 feet on centers.

(4) No more than two employees shall occupy any given 8 feet of a bracket or form scaffold at any one time.

Tools and materials shall not exceed 75 pounds in addition to the occupancy.

(5) Wooden figure-four scaffolds:

Maximum intended load 25 lb/ft²

Uprights 2 x 4 in or 2 x 6 in

Bearers (two) 1 x 6 in

Braces 1 x 6 in

Maximum length of bearers (unsupported) 3 ft - 6 in

(i) Outrigger bearers shall consist of two pieces of 1 x 6 inch lumber nailed on opposite sides of the vertical support.

(ii) Bearers for wood figure-four brackets shall project not more than 3 feet 6 inches from the outside of the form support, and shall be braced and secured to prevent tipping or turning. The knee or angle brace shall intersect the bearer at least 3 feet from the form at an angle of approximately 45 degrees, and the lower end shall be nailed to a vertical support.

(6) Metal bracket scaffolds:

Maximum intended load 25 lb/ft²

Uprights 2 x 4 inch

Bearers As designed

Braces As designed

(7) Wood bracket scaffolds:

Maximum intended load 25 lb/ft²
 Uprights 2 x 4 in or 2 x 6 in
 Bearers 2 x 6 in
 Maximum scaffold width 3 ft 6 in
 Braces 1 x 6 in

(h) *Roof bracket scaffolds*. No specific guidelines or tables are given.

(i) *Outrigger scaffolds (single level)*. No specific guidelines or tables are given.

(j) *Pump jack scaffolds*. Wood poles shall not exceed 30 feet in height. Maximum intended load -- 500 lbs between poles; applied at the center of the span. Not more than two employees shall be on a pump jack scaffold at one time between any two supports. When 2 x 4's are spliced together to make a 4 x 4 inch wood pole, they shall be spliced with "10 penny" common nails no more than 12 inches center to center, staggered uniformly from the opposite outside edges.

(k) *Ladder jack scaffolds*. Maximum intended load -- 25 lb/ft². However, not more than two employees shall occupy any platform at any one time. Maximum span between supports shall be 8 feet.

(l) *Window jack scaffolds*. Not more than one employee shall occupy a window jack scaffold at any one time.

(m) *Crawling boards (chicken ladders)*. Crawling boards shall be not less than 10 inches wide and 1 inch thick, with cleats having a minimum 1 x 1-1/2 inch cross-sectional area. The cleats shall be equal in length to the width of the board and spaced at equal intervals not to exceed 24 inches.

(n) *Step, platform, and trestle ladder scaffolds*. No additional guidelines or tables are given.

(o) *Single-point adjustable suspension scaffolds*. Maximum intended load -- 250 lbs.

Wood seats for boatswains' chairs shall be not less than 1 inch thick if made of non-laminated wood, or 5/8 inches thick if made of marine quality plywood.

(p) *Two-point adjustable suspension scaffolds*.

(1) In addition to direct connections to buildings (except window cleaners' anchors) acceptable ways to prevent scaffold sway include angulated roping and static lines. Angulated roping is a system of platform suspension in which the upper wire rope sheaves or suspension points are closer to the plane of the building face than the corresponding attachment points on the platform, thus causing the platform to press against the face of the building. Static lines are separate ropes secured at their top and bottom ends closer to the plane of the building face than the outermost edge of the platform. By drawing the static line taut, the platform is drawn against the face of the building.

(2) On suspension scaffolds designed for a working load of 500 pounds, no more than two employees shall be permitted on the scaffold at one time. On suspension scaffolds with a working load of 750 pounds, no more than three employees shall be permitted on the scaffold at one time.

(3) Ladder-type platforms. The side stringer shall be of clear straight-grained spruce. The rungs

shall be of straight-grained oak, ash, or hickory, at least 1-1/8 inches in diameter, with 7/8 inch tenons mortised into the side stringers at least 7/8 inch. The stringers shall be tied together with tie rods not less than 1/4 inch in diameter, passing through the stringers and riveted up tight against washers on both ends. The flooring strips shall be spaced not more than 5/8 inch apart, except at the side rails where the space may be 1 inch. Ladder-type platforms shall be constructed in accordance with the following table:

Schedule for Ladder-Type Platforms

Length of Platform	12 feet	14 & 16 feet	18 & 20 feet
Side stringers, minimum cross section (finished sizes): at ends	1-3/4 x 2-3/4 in.	1-3/4 x 2-3/4 in.	1-3/4 x 3 in.
at middle	1-3/4 x 3-3/4 in.	1-3/4 x 3-3/4 in.	1-3/4 x 4 in.
Reinforcing strip (minimum)	A 1/8 x 7/8 inch steel reinforcing strip shall be attached to the side or underside, full length. Rungs shall be 1-1/8 inch minimum diameter with at least 7/8 inch in diameter tenons, and the maximum spacing shall be 12 inches to center.		
Tie rods: Number (minimum) Diameter (minimum)	3 1/4 in.	4 1/4 in.	4 1/4 in.
Flooring, minimum finished size	1/2 x 2-3/4 in.	1/2 x 2-3/4 in.	1/2 x 2-3/4 in.

Schedule for Ladder-Type Platforms

Length of Platform:	22 & 24 ft	28 & 30 ft.
Side stringers, minimum cross section (finished sizes): at ends	1-3/4 x 3 in.	1-3/4 x 3-1/2 in.
at middle	1-3/4 x 4-1/4 in.	1-3/4 x 5 in.

Reinforcing strip (minimum)	A 1/8 x 7/8-inch steel reinforcing strip shall be attached to the side or under side, full length.	
Rungs	Rungs shall be 1-1/8 inch minimum diameter with at least 7/8 inch in diameter tenons, and the maximum spacing shall be 12 inches to center. Tie rods	
Number (minimum)	5	6
Diameter (minimum)	1/4 in.	1/4 in.
Flooring, minimum finished size	1/2 x 2-3/4 in.	1/2 x 2-3/4 in.

(4) **Plank-Type Platforms.** Plank-type platforms shall be composed of not less than nominal 2 x 8 inch unspliced planks, connected together on the underside with cleats at intervals not exceeding 4 feet, starting 6 inches from each end. A bar or other effective means shall be securely fastened to the platform at each end to prevent the platform from slipping off the hanger. The span between hangers for plank-type platforms shall not exceed 10 feet.

(5) **Beam-Type Platforms.** Beam platforms shall have side stringers of lumber not less than 2 x 6 inches set on edge. The span between hangers shall not exceed 12 feet when beam platforms are used. The flooring shall be supported on 2 x 6 inch cross beams, laid flat and set into the upper edge of the stringers with a snug fit, at intervals of not more than 4 feet, securely nailed to the cross beams. Floor-boards shall not be spaced more than 1/2 inch apart.

(q)(1) *Multi-point adjustable suspension scaffolds and stonemasons' multi-point adjustable suspension scaffolds.* No specific guidelines or tables are given for these scaffolds.

(q)(2) *Masons' multi-point adjustable suspension scaffolds.* Maximum intended load—50 lb/ft². Each outrigger beam shall be at least a standard 7 inch, 15.3 pound steel I-beam, at least 15 feet long. Such beams shall not project more than 6 feet 6 inches beyond the bearing point. Where the overhang exceeds 6 feet 6 inches, outrigger beams shall be composed of stronger beams or multiple beams.

(r) *Catenary scaffolds.* (1) Maximum intended load -500 lbs.

(2) Not more than two employees shall be permitted on the scaffold at one time.

(3) Maximum capacity of come-along shall be 2,000 lbs.

(4) Vertical pickups shall be spaced not more than 50 feet apart.

(5) Ropes shall be equivalent in strength to at least 1/2 inch (1.3 cm) diameter improved plow steel wire rope.

(s) *Float (ship) scaffolds.* (1) Maximum intended load — 750 lbs.

(2) Platforms shall be made of 3/4 inch plywood, equivalent in rating to American Plywood Association Grade B-B, Group I, Exterior.

(3) Bearers shall be made from 2 x 4 inch, or 1 x 10 inch rough lumber. They shall be free of knots and other flaws.

(4) Ropes shall be equivalent in strength to at least 1 inch (2.5 cm) diameter first grade manila rope.

(t) *Interior hung scaffolds.*

Bearers (use on edge) 2 x 10 in

Maximum intended load

Maximum span

25 lb/ft² 10 ft

50 lb/ft² 10 ft

75 lb/ft² 7 ft

(u) *Needle beam scaffolds*

Maximum intended load 25 lb/ft²

Beams 4 x 6 in

Maximum platform span 8 ft

Maximum beam span 10 ft

(1) Ropes shall be attached to the needle beams by a scaffold hitch or an eye splice. The loose end of the rope shall be tied by a bowline knot or by a round turn and a half hitch.

(2) Ropes shall be equivalent in strength to at least 1 inch (2.5 cm) diameter first grade manila rope.

(v) *Multi-level suspension scaffolds*. No additional guidelines or tables are being given for these scaffolds.

(w) *Mobile Scaffolds*. Stability test as described in the ANSI A92 series documents, as appropriate for the type of scaffold, can be used to establish stability for the purpose of §1926.452(w)(6).

(x) *Repair bracket scaffolds*. No additional guidelines or tables are being given for these scaffolds.

(y) *Stilts*. No specific guidelines or tables are given.

(z) *Tank builder's scaffold*.

(1) The maximum distance between brackets to which scaffolding and guardrail supports are attached shall be no more than 10 feet 6 inches.

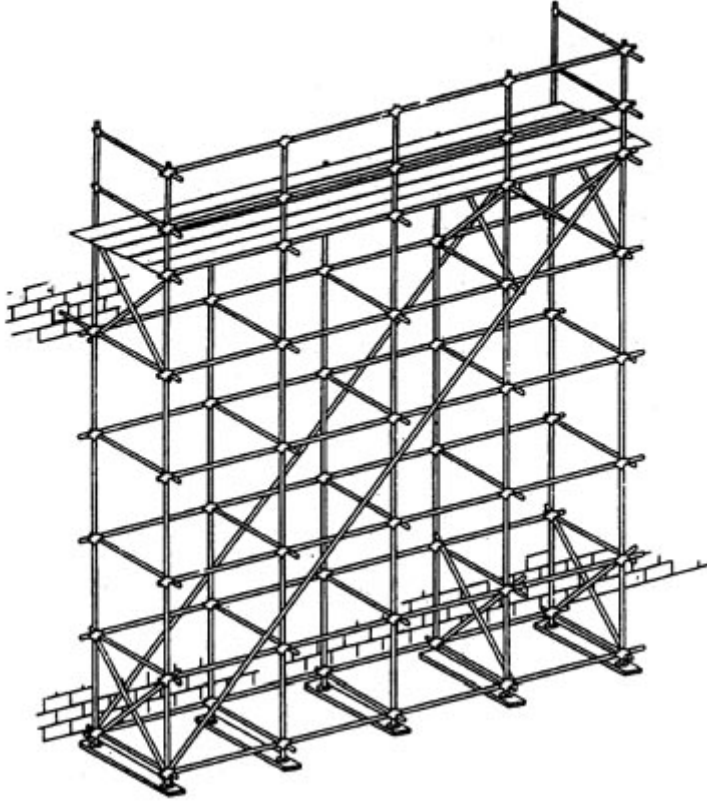
(2) Not more than three employees shall occupy a 10 feet 6 inch span of scaffold planking at any time.

(3) A taut wire or synthetic rope supported on the scaffold brackets shall be installed at the scaffold plank level between the innermost edge of the scaffold platform and the curved plate structure of the tank shell to serve as a safety line in lieu of an inner guardrail assembly where the space between the scaffold platform and the tank exceeds 12 inches (30.48 cm). In the event the open space on either side of the rope exceeds 12 inches (30.48 cm), a second wire or synthetic rope appropriately placed, or guardrails in accordance with §1926.451(e)(4), shall be installed in order to reduce that open space to less than 12 inches (30.48 cm).

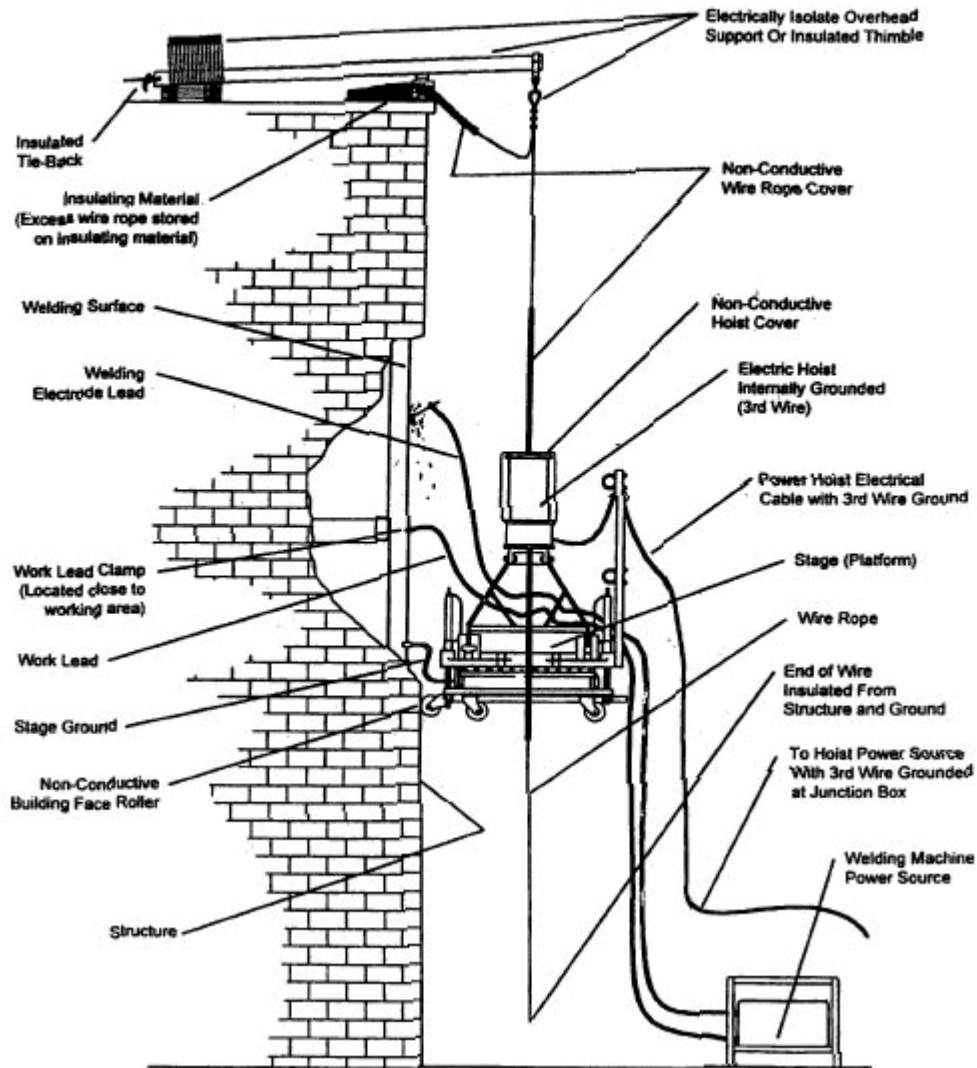
(4) Scaffold planks of rough full-dimensioned 2-inch (5.1 cm) x 12-inch (30.5 cm) Douglas Fir or Southern Yellow Pine of Select Structural Grade shall be used. Douglas Fir planks shall have a fiber stress of at least 1900 lb/in² (130,929 n/cm²) and a modulus of elasticity of at least 1,900,000 lb/in² (130,929,000 n/cm²), while Yellow Pine planks shall have a fiber stress of at least 2500 lb/in² (172,275 n/cm²) and a modulus of elasticity of at least 2,000,000 lb/in² (137,820,000 n/cm²).

(5) Guardrails shall be constructed of a taut wire or synthetic rope, and shall be supported by angle irons attached to brackets welded to the steel plates. These guardrails shall comply with §1926.451(e)(4). Guardrail supports shall be located at no greater than 10 feet 6 inch intervals.

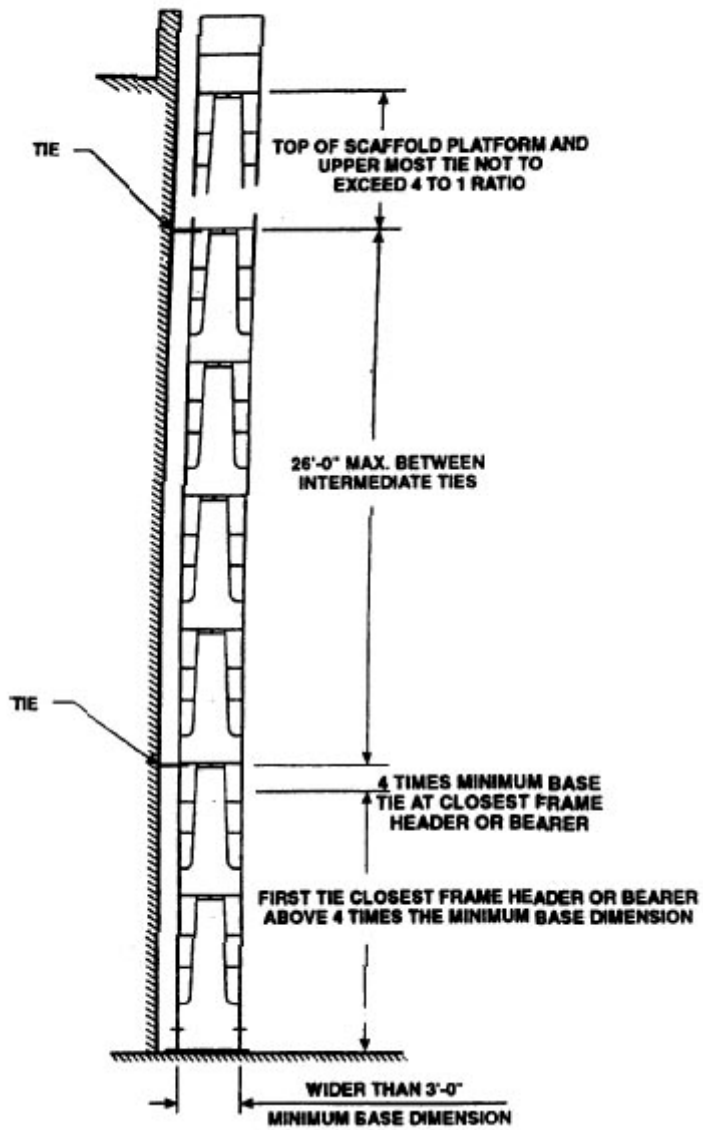
BRACING – TUBE & COUPLER SCAFFOLDS



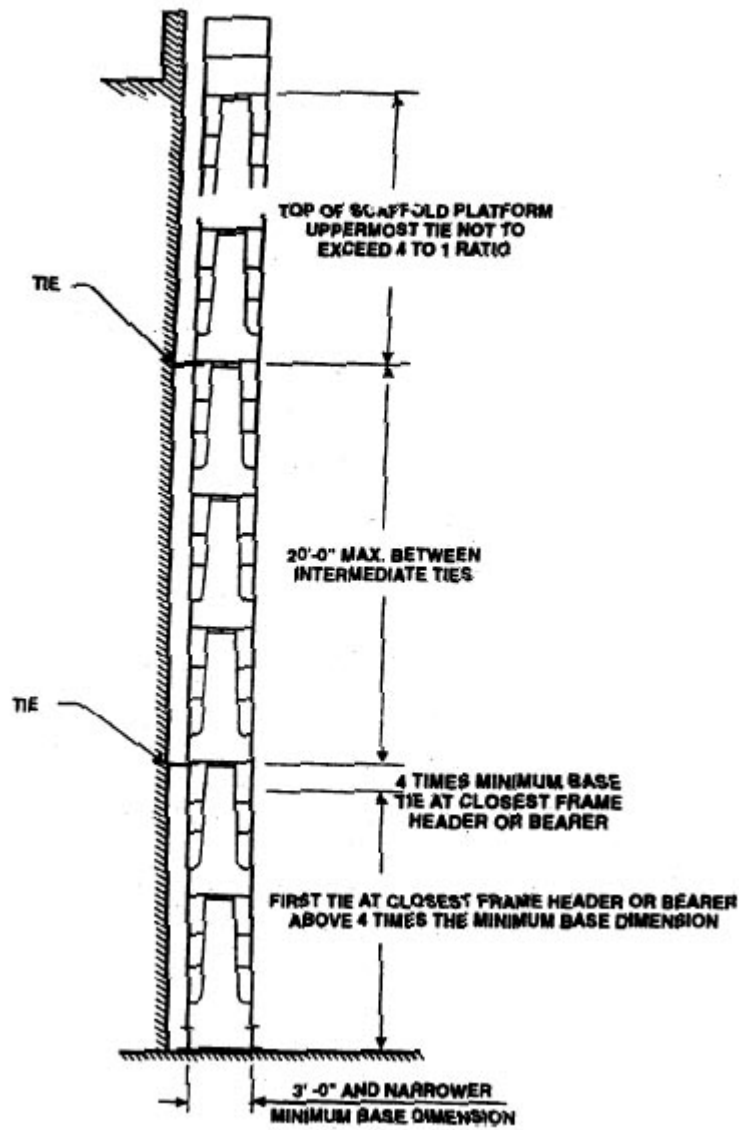
SUSPENDED SCAFFOLD PLATFORM WELDING PRECAUTIONS



MAXIMUM VERTICAL TIE SPACING WIDER THAN 3'-0" BASES



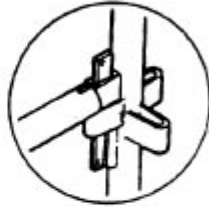
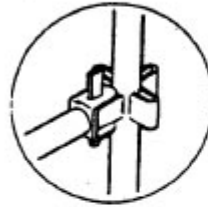
MAXIMUM VERTICAL TIE SPACING 3'-0" AND NARROWER BASES



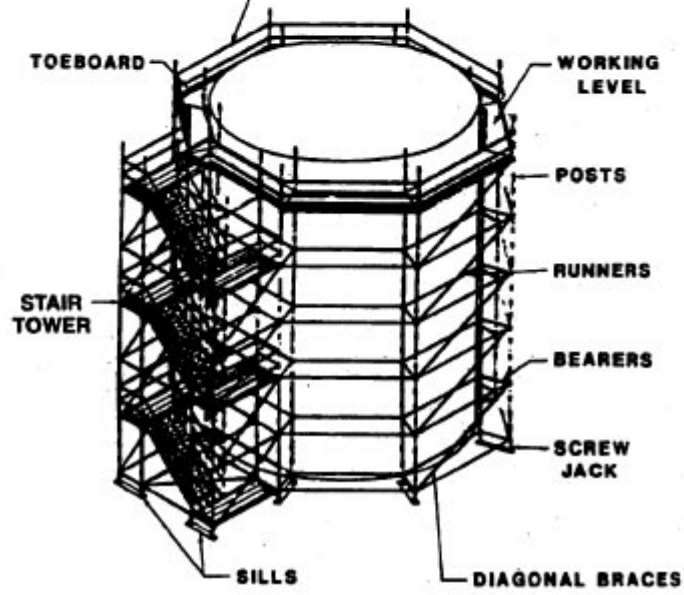
SYSTEM SCAFFOLD



JOINT CONNECTIONS
VARY ACCORDING
TO MANUFACTURER



GUARD RAIL SYSTEM



SPIB: DNS IND 65

K019 S-DRY

7

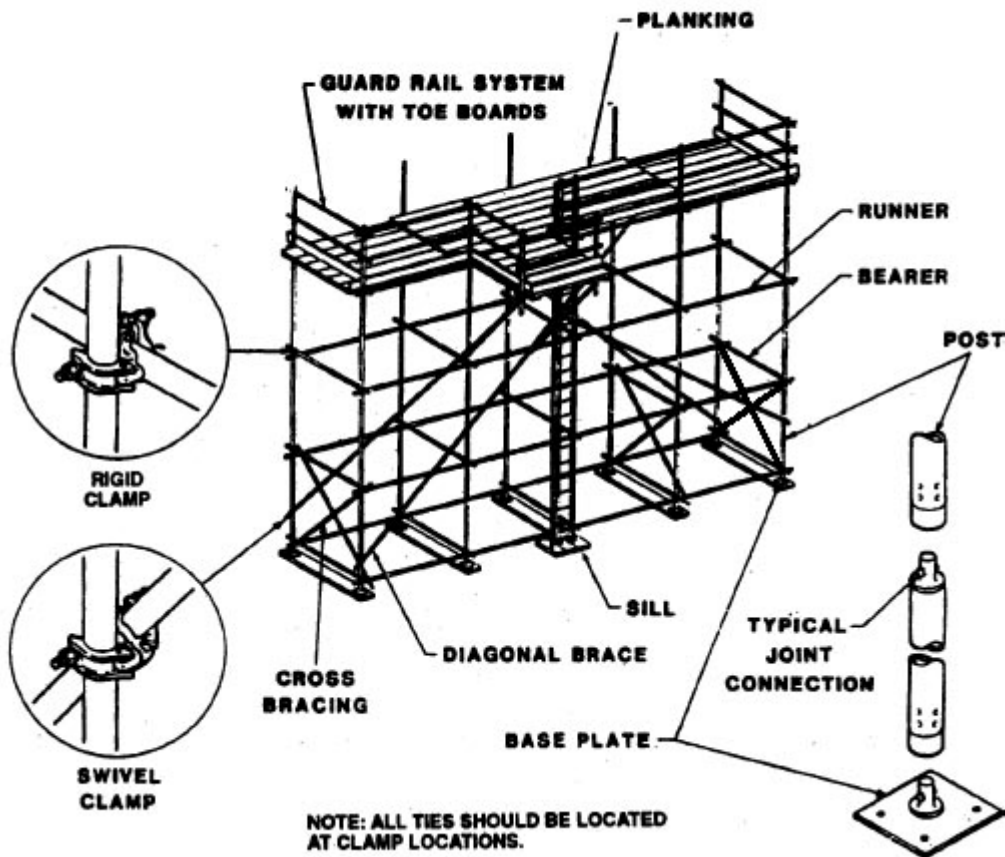
SCAFFOLD PLANK

Grade stamp courtesy of Southern Pine Inspection Bureau

MILL 10
WC
LB
SEL STR
SCAF PLK
D. FIR S. DRY

Grade stamp courtesy of West Coast Lumber Inspection Bureau

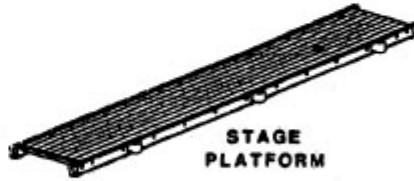
TUBE and COUPLER SCAFFOLD



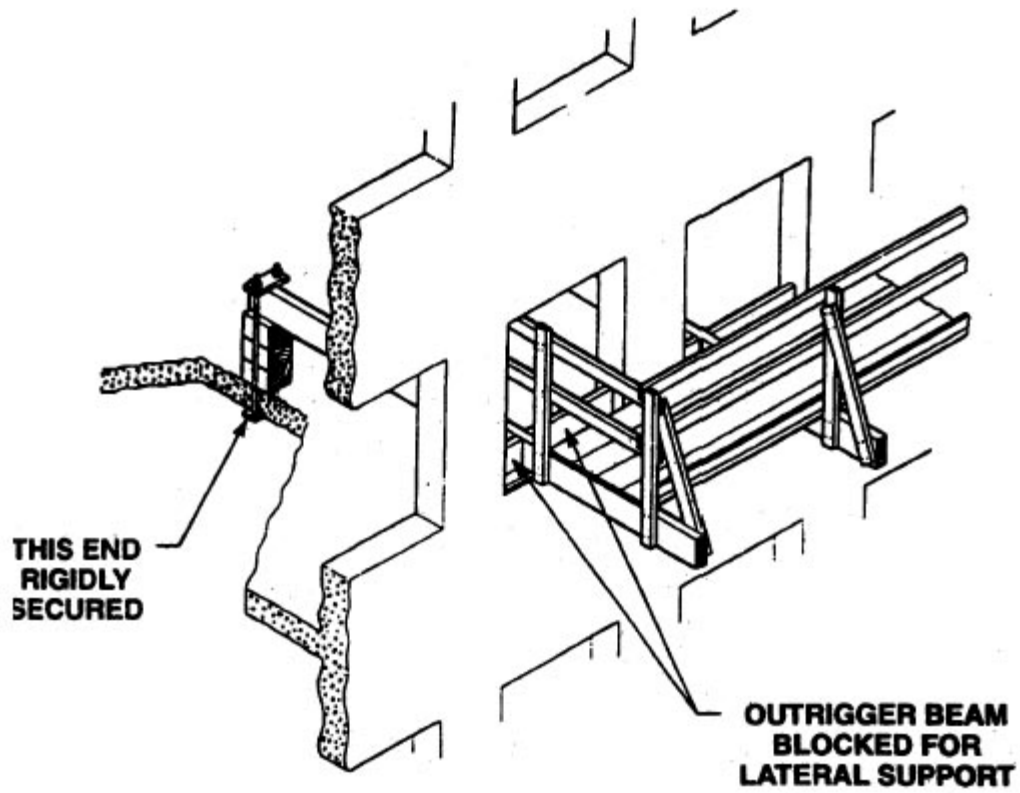
SCAFFOLDING WORK SURFACES



SCAFFOLD PLANKS



OUTRIGGER SCAFFOLD



STAGING RELEASE

Project: _____

Scaffolding Contractor: _____

In order to facilitate this construction project, and at the same time allow your employees access to the use of our scaffolding, Seal-Tight Caulking & Masonry Restoration, hereafter "Scaffolding Contractor" requires your firm, the undersigned "Subcontractor", to execute this form.

The subcontractor at its own expense will conform to the basic safety policy by complying with specific safety requirements promulgated by any governmental body or authority, including but not limited to, the requirements of the Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969 and all standards and regulations which have been or shall be promulgated by the parties or agencies which administer such acts.

Subcontractor generally, and in particular with respect to its portion of the work on the scaffolding shall comply with said requirements, standards and regulations and require and be directly responsible for compliance therewith by all of its said agents, employees, materialmen and subcontractors. The subcontractor agrees to receive, respond to, defend and be entirely responsible for all citations, assessments, fines or penalties which may be incurred by reason of the failure to so comply of the Subcontractor and/or its agents, employees, materialmen or subcontractors, and Subcontractor shall indemnify and hold Scaffolding Contractor harmless from all resulting claims or liabilities.

Furthermore, should Subcontractor be allowed to use any scaffolding, or facilities, manned or unmanned, gratuitously or otherwise which are owned, leased or rented by the Scaffolding Contractor, such use is expressly subject to the following conditions:

- * The Subcontractor agrees that the scaffolding and all persons using such scaffolding are under the Subcontractor's exclusive jurisdiction, supervision and control.
- * The Subcontractor agrees to indemnify and hold the Scaffolding Contractor, its employees and agents harmless from all claims of death or injury to persons, including the Scaffolding Contractor's employees, and from all loss, damage or injury to property, including the scaffolding or facilities, whether or not based upon the condition thereof, or any alleged negligence of the Scaffolding Contractor in permitting the use thereof.
- * The Subcontractor's duty to indemnify and hold Scaffolding Contractor harmless hereunder shall include all costs or expenses arising out of all claims specified herein, and without limiting the foregoing shall include all court and/or arbitration costs, filing fees, attorney's fees and costs of settlement.

Subcontractor: _____

Accepted By: _____

Personal Protective Equipment

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

OSHA 3151-12R
2003

This informational booklet provides a general overview of a particular topic related to OSHA standards. It does not alter or determine compliance responsibilities in OSHA standards or the *Occupational Safety and Health Act of 1970*. Because interpretations and enforcement policy may change over time, you should consult current OSHA administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the Courts for additional guidance on OSHA compliance requirements.

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This information is available to sensory impaired individuals upon request. Voice phone: (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

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Introduction

Hazards exist in every workplace in many different forms: sharp edges, falling objects, flying sparks, chemicals, noise and a myriad of other potentially dangerous situations. The Occupational Safety and Health Administration (OSHA) requires that employers protect their employees from workplace hazards that can cause injury.

Controlling a hazard at its source is the best way to protect employees. Depending on the hazard or workplace conditions, OSHA recommends the use of engineering or work practice controls to manage or eliminate hazards to the greatest extent possible. For example, building a barrier between the hazard and the employees is an engineering control; changing the way in which employees perform their work is a work practice control.

When engineering, work practice and administrative controls are not feasible or do not provide sufficient protection, employers must provide personal protective equipment (PPE) to their employees and ensure its

use. Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to a variety of hazards. Examples of PPE include such items as gloves, foot and eye protection, protective hearing devices (earplugs, muffs) hard hats, respirators and full body suits.

This guide will help both employers and employees do the following:

- ? Understand the types of PPE.
- ? Know the basics of conducting a "hazard assessment" of the workplace.
- ? Select appropriate PPE for a variety of circumstances.
- ? Understand what kind of training is needed in the proper use and care of PPE.

The information in this guide is general in nature and does not address all workplace hazards or PPE requirements. The information, methods and procedures in this guide are based on the OSHA requirements for PPE as set forth in the Code of Federal Regulations (CFR) at 29 CFR 1910.132 (General requirements); 29 CFR 1910.133 (Eye and face protection); 29 CFR 1910.135 (Head protection); 29 CFR 1910.136 (Foot protection); 29 CFR 1910.137 (Electrical protective equipment); 29 CFR 1910.138 (Hand protection); and regulations that cover the construction industry, at 29 CFR 1926.95 (Criteria for personal protective equipment); 29 CFR 1926.96 (Occupational foot protection); 29 CFR 1926.100 (Head protection); 29 CFR 1926.101 (Hearing protection); and 29 CFR 1926.102 (Eye and face protection); and for the maritime industry at 29 CFR 1915.152 (General requirements); 29 CFR 1915.153 (Eye and face protection); 29 CFR 1915.155 (Head protection); 29 CFR 1915.156 (Foot protection); and 29 CFR 1915.157 (Hand and body protection).

This guide does not address PPE requirements related to respiratory protection (29 CFR 1910.134) as this information is covered in detail in OSHA Publication 3079, "Respiratory Protection". There is a brief discussion of hearing protection in this publication but users should refer to OSHA Publication 3074, "Hearing Conservation" for more detailed information on the requirements to protect employees' hearing in the workplace.

The Requirement for PPE

To ensure the greatest possible protection for employees in the workplace, the cooperative efforts of both employers and employees will help in establishing and maintaining a safe and healthful work environment.

In general, employers are responsible for:

- ? Performing a "hazard assessment" of the workplace to identify and control physical and health hazards.
- ? Identifying and providing appropriate PPE for employees.
- ? Training employees in the use and care of the PPE.
- ? Maintaining PPE, including replacing worn or damaged PPE.
- ? Periodically reviewing, updating and evaluating the effectiveness of the PPE program.

In general, employees should:

- ? Properly wear PPE,
- ? Attend training sessions on PPE,
- ? Care for, clean and maintain PPE, and
- ? Inform a supervisor of the need to repair or replace PPE.

Specific requirements for PPE are presented in many different OSHA standards, published in 29 CFR. Some standards require that employers provide PPE at no cost to the employee while others simply state that the employer must provide PPE. Appendix A at page 40 lists those standards that require the employer to provide PPE and those that require the employer to provide PPE at no cost to the employee.

The Hazard Assessment

A first critical step in developing a comprehensive safety and health program is to identify physical and health hazards in the workplace. This process is known as a "hazard assessment." Potential hazards may be physical or health-related and a comprehensive hazard assessment should identify hazards in both categories. Examples of physical hazards include moving objects, fluctuating temperatures, high intensity lighting, rolling or pinching objects, electrical connections and sharp edges. Examples of health hazards include overexposure to harmful dusts, chemicals or radiation.

The hazard assessment should begin with a walk-through survey of the facility to develop a list of potential hazards in the following basic hazard categories:

- ? Impact,
- ? Penetration,
- ? Compression (roll-over),
- ? Chemical,
- ? Heat/cold,
- ? Harmful dust,
- ? Light (optical) radiation, and
- ? Biologic.

In addition to noting the basic layout of the facility and reviewing any history of occupational illnesses or injuries, things to look for during the walk-through survey include:

- ? Sources of electricity.
- ? Sources of motion such as machines or processes where movement may exist that could result in an impact between personnel and equipment.
- ? Sources of high temperatures that could result in burns, eye injuries or fire.
- ? Types of chemicals used in the workplace.
- ? Sources of harmful dusts.
- ? Sources of light radiation, such as welding, brazing, cutting, furnaces, heat treating, high intensity lights, etc.
- ? The potential for falling or dropping objects.
- ? Sharp objects that could poke, cut, stab or puncture.
- ? Biologic hazards such as blood or other potentially infected material.

When the walk-through is complete, the employer should organize and analyze the data so that it may be efficiently used in determining the proper types of PPE required at the worksite. The employer should become aware of the different types of PPE available and the levels of protection offered. It is definitely a good idea to select PPE that will provide a level of protection greater than the minimum required to protect employees from hazards.

The workplace should be periodically reassessed for any changes in conditions, equipment or operating procedures that could affect occupational hazards. This periodic reassessment should also include a review of injury and illness records to spot any trends or areas of concern and taking appropriate corrective action. The suitability of existing PPE, including an evaluation of its condition and age, should be included in the reassessment.

Documentation of the hazard assessment is required through a written certification that includes the following information:

- ? Identification of the workplace evaluated;
 - ? Name of the person conducting the assessment;
 - ? Date of the assessment; and
 - ? Identification of the document certifying completion of the hazard assessment.
-

Selecting PPE

All PPE clothing and equipment should be of safe design and construction, and should be maintained in a clean and reliable fashion. Employers should take the fit and comfort of PPE into consideration when selecting appropriate items for their workplace. PPE that fits well and is comfortable to wear will encourage employee use of PPE. Most protective devices are available in multiple sizes and care should be taken to select the proper size for each employee. If several different types of PPE are worn together, make sure they are compatible. If PPE does not fit properly, it can make the difference between being safely covered or dangerously exposed. It may not provide the level of protection desired and may discourage employee use.

OSHA requires that many categories of PPE meet or be equivalent to standards developed by the American National Standards Institute (ANSI). ANSI has been preparing safety standards since the 1920s, when the first safety standard was approved to protect the heads and eyes of industrial workers. Employers who need to provide PPE in the categories listed below must make certain that any new equipment procured meets the cited ANSI standard. Existing PPE stocks must meet the ANSI standard in effect at the time of its manufacture or provide protection equivalent to PPE manufactured to the ANSI criteria. Employers should inform employees who provide their own PPE of the employer's selection decisions and ensure that any employee-owned PPE used in the workplace conforms to the employer's criteria, based on the hazard assessment, OSHA requirements and ANSI standards. OSHA requires PPE to meet the following ANSI standards:

- ? Eye and Face Protection: ANSI Z87.1-1989 (USA Standard for Occupational and Educational Eye and Face Protection).
- ? Head Protection: ANSI Z89.1-1986.
- ? Foot Protection: ANSI Z41.1-1991.

For hand protection, there is no ANSI standard for gloves but OSHA recommends that selection be based upon the tasks to be performed and the performance and construction characteristics of the glove material. For protection against chemicals, glove selection must be based on the chemicals encountered, the chemical resistance and the physical properties of the glove material.

Training Employees in the Proper Use of PPE

Employers are required to train each employee who must use PPE. Employees must be trained to know at least the following:

- ? When PPE is necessary.
- ? What PPE is necessary.
- ? How to properly put on, take off, adjust and wear the PPE.
- ? The limitations of the PPE.
- ? Proper care, maintenance, useful life and disposal of PPE.

Employers should make sure that each employee demonstrates an understanding of the PPE training as well as the ability to properly wear and use PPE before they are allowed to perform work requiring the use of the PPE. If an employer believes that a previously trained employee is not demonstrating the proper understanding and skill level in the use of PPE, that employee should receive retraining. Other situations that

require additional or retraining of employees include the following circumstances: changes in the workplace or in the type of required PPE that make prior training obsolete.

The employer must document the training of each employee required to wear or use PPE by preparing a certification containing the name of each employee trained, the date of training and a clear identification of the subject of the certification.

Eye and Face Protection

Employees can be exposed to a large number of hazards that pose danger to their eyes and face. OSHA requires employers to ensure that employees have appropriate eye or face protection if they are exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially infected material or potentially harmful light radiation.

Many occupational eye injuries occur because workers are not wearing any eye protection while others result from wearing improper or poorly fitting eye protection. Employers must be sure that their employees wear appropriate eye and face protection and that the selected form of protection is appropriate to the work being performed and properly fits each worker exposed to the hazard.

Prescription Lenses

Everyday use of prescription corrective lenses will not provide adequate protection against most occupational eye and face hazards, so employers must make sure that employees with corrective lenses either wear eye protection that incorporates the prescription into the design or wear additional eye protection over their prescription lenses. It is important to ensure that the protective eyewear does not disturb the proper positioning of the prescription lenses so that the employee's vision will not be inhibited or limited. Also, employees who wear contact lenses must wear eye or face PPE when working in hazardous conditions.

Eye Protection for Exposed Workers

OSHA suggests that eye protection be routinely considered for use by carpenters, electricians, machinists, mechanics, millwrights, plumbers and pipefitters, sheetmetal workers and tinsmiths, assemblers, sanders, grinding machine operators, sawyers, welders, laborers, chemical process operators and handlers, and timber cutting and logging workers. Employers of workers in other job categories should decide whether there is a need for eye and face PPE through a hazard assessment.

Examples of potential eye or face injuries include:

- ? Dust, dirt, metal or wood chips entering the eye from activities such as chipping, grinding, sawing, hammering, the use of power tools or even strong wind forces.
- ? Chemical splashes from corrosive substances, hot liquids, solvents or other hazardous solutions.
- ? Objects swinging into the eye or face, such as tree limbs, chains, tools or ropes.
- ? Radiant energy from welding, harmful rays from the use of lasers or other radiant light (as well as heat, glare, sparks, splash and flying particles).

Types of Eye Protection

Selecting the most suitable eye and face protection for employees should take into consideration the following elements:

- ? Ability to protect against specific workplace hazards.
- ? Should fit properly and be reasonably comfortable to wear.
- ? Should provide unrestricted vision and movement.
- ? Should be durable and cleanable.
- ? Should allow unrestricted functioning of any other required PPE.

The eye and face protection selected for employee use must clearly identify the manufacturer. Any new eye and face protective devices must comply with ANSI Z87.1-1989 or be at least as effective as this standard requires. Any equipment purchased before this requirement took effect on July 5, 1994, must comply with the earlier ANSI Standard (ANSI Z87.1-1968) or be shown to be equally effective.

An employer may choose to provide one pair of protective eyewear for each position rather than individual eyewear for each employee. If this is done, the employer must make sure that employees disinfect shared protective eyewear after each use. Protective eyewear with corrective lenses may only be used by the employee for whom the corrective prescription was issued and may not be shared among employees.

Some of the most common types of eye and face protection include the following:

- ? **Safety spectacles.** These protective eyeglasses have safety frames constructed of metal or plastic and impact-resistant lenses. Side shields are available on some models.
- ? **Goggles.** These are tight-fitting eye protection that completely cover the eyes, eye sockets and the facial area immediately surrounding the eyes and provide protection from impact, dust and splashes. Some goggles will fit over corrective lenses.
- ? **Welding shields.** Constructed of vulcanized fiber or fiberglass and fitted with a filtered lens, welding shields protect eyes from burns caused by infrared or intense radiant light; they also protect both the eyes and face from flying sparks, metal spatter and slag chips produced during welding, brazing, soldering and cutting operations. OSHA requires filter lenses to have a shade number appropriate to protect against the specific hazards of the work being performed in order to protect against harmful light radiation.
- ? **Laser safety goggles.** These specialty goggles protect against intense concentrations of light produced by lasers. The type of laser safety goggles an employer chooses will depend upon the equipment and operating conditions in the workplace.
- ? **Face shields.** These transparent sheets of plastic extend from the eyebrows to below the chin and across the entire width of the employee's head. Some are polarized for glare protection. Face shields protect against nuisance dusts and potential splashes or sprays of hazardous liquids but will not provide adequate protection against impact hazards. Face shields used in combination with goggles or safety spectacles will provide additional protection against impact hazards.

Each type of protective eyewear is designed to protect against specific hazards. Employers can identify the specific workplace hazards that threaten employees' eyes and faces by completing a hazard assessment as outlined in the earlier section.

Welding Operations

The intense light associated with welding operations can cause serious and sometimes permanent eye damage if operators do not wear proper eye protection. The intensity of light or radiant energy produced by welding, cutting or brazing operations varies according to a number of factors including the task producing the light, the electrode size and the arc current. The following table shows the minimum protective shades for a variety of welding, cutting and brazing operations in general industry and in the shipbuilding industry.

Table 1
Filter Lenses for Protection Against Radiant Energy

Operations	Electrode size in 1/32" (0.8mm)	Arc current	Minimum* protective shade
Shielded metal arc welding	< 3	< 60	7
	3 - 5	60 - 160	8
	5 - 8	160 - 250	10
	> 8	250 - 550	11

Gas metal arc welding and flux cored arc welding		< 60	7
		60 - 160	10
		160 - 250	10
		250 - 500	10
Gas tungsten arc welding		< 50	8
		50 - 150	8
		150 - 500	10
Air carbon	(light)	< 500	10
Arc cutting	(heavy)	500 - 1,000	11
Plasma arc welding		< 20	6
		20 - 100	8
		100 - 400	10
		400 - 800	11
Plasma arc cutting	(light)**	< 300	8
	(medium)**	300 - 400	9
	(heavy)**	400 - 800	10
Torch brazing			3
Torch soldering			2
Carbon arc welding			14

Table 1
Filter Lenses for Protection Against Radiant Energy

Operations	Plate thickness inches	Plate thickness mm	Minimum* protective shade
Gas welding: Light	< 1/8	< 3.2	4
Gas welding: Medium	1/8 - 1/2	3.2 - 12.7	5
Gas welding: Heavy	> 1/2	> 12.7	6
Oxygen cutting: Light	< 1	< 25	3
Oxygen cutting: Medium	1 - 6	25 - 150	4
Oxygen cutting: Heavy	> 6	> 150	5

Source: 29 CFR 1910.133(a)(5).

* As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

** These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the workpiece.

The construction industry has separate requirements for filter lens protective levels for specific types of welding operations, as indicated in the table below:

Table 2
Construction Industry Requirements for Filter Lens Shade
Numbers for Protection Against Radiant Energy

Welding Operation	Shade Number
Shielded metal-arc welding 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	10
Gas-shielded arc welding (nonferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	11
Gas-shielded arc welding (ferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	12
Shielded metal-arc welding 3/16-, 7/32-, 1/4-inch diameter electrodes	12
5/16-, 3/8-inch diameter electrodes	14
Atomic hydrogen welding	10 - 14
Carbon-arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 to 6 inches	4 or 5
Heavy cutting, more than 6 inches	5 or 6
Gas welding (light), up to 1/8-inch	4 or 5
Gas welding (medium), 1/8- to 1/2-inch	5 or 6
Gas welding (heavy), more than 1/2-inch	6 or 8

Source: 29 CFR 1926.102(b)(1).

Laser Operations

Laser light radiation can be extremely dangerous to the unprotected eye and direct or reflected beams can cause permanent eye damage. Laser retinal burns can be painless, so it is essential that all personnel in or around laser operations wear appropriate eye protection.

Laser safety goggles should protect for the specific wavelength of the laser and must be of sufficient optical density for the energy involved. Safety goggles intended for use with laser beams must be labeled with the laser wavelengths for which they are intended to be used, the optical density of those wavelengths and the visible light transmission.

The table below lists maximum power or energy densities and appropriate protection levels for optical densities 5 through 8.

Table 3
Selecting Laser Safety Glass

Intensity, CW maximum power density (watts/cm)	Attenuation	
	Optical density (O.D.)	Attenuation factor
10-2	5	10
10-1	6	10
1.0	7	10
10.0	8	10

Source: 29 CFR 1926.102(b)(2).

Head Protection

Protecting employees from potential head injuries is a key element of any safety program. A head injury can impair an employee for life or it can be fatal. Wearing a safety helmet or hard hat is one of the easiest ways to protect an employee's head from injury. Hard hats can protect employees from impact and penetration hazards as well as from electrical shock and burn hazards.

Employers must ensure that their employees wear head protection if any of the following apply:

- ? Objects might fall from above and strike them on the head;
- ? They might bump their heads against fixed objects, such as exposed pipes or beams; or
- ? There is a possibility of accidental head contact with electrical hazards.

Some examples of occupations in which employees should be required to wear head protection include construction workers, carpenters, electricians, linemen, plumbers and pipefitters, timber and log cutters, welders, among many others. Whenever there is a danger of objects falling from above, such as working below others who are using tools or working under a conveyor belt, head protection must be worn. Hard hats must be worn with the bill forward to protect employees properly.

In general, protective helmets or hard hats should do the following:

- ? Resist penetration by objects.
- ? Absorb the shock of a blow.
- ? Be water-resistant and slow burning.
- ? Have clear instructions explaining proper adjustment and replacement of the suspension and headband.

Hard hats must have a hard outer shell and a shock-absorbing lining that incorporates a headband and straps that suspend the shell from 1 to 1 1/4 inches (2.54 cm to 3.18 cm) away from the head. This type of design provides shock absorption during an impact and ventilation during normal wear.

Protective headgear must meet ANSI Standard Z89.1-1986 (Protective Headgear for Industrial Workers) or provide an equivalent level of protection. Helmets purchased before July 5, 1994 must comply with the earlier ANSI Standard (Z89.1-1969) or provide equivalent protection.

Types of Hard Hats

There are many types of hard hats available in the marketplace today. In addition to selecting protective headgear that meets ANSI standard requirements, employers should ensure that employees wear hard hats that provide appropriate protection against potential workplace hazards. It is important for employers to understand all potential hazards when making this selection, including electrical hazards. This can be done through a comprehensive hazard analysis and an awareness of the different types of protective headgear

available.

Hard hats are divided into three industrial classes:

- ? **Class A** hard hats provide impact and penetration resistance along with limited voltage protection (up to 2,200 volts).
- ? **Class B** hard hats provide the highest level of protection against electrical hazards, with high-voltage shock and burn protection (up to 20,000 volts). They also provide protection from impact and penetration hazards by flying/falling objects.
- ? **Class C** hard hats provide lightweight comfort and impact protection but offer no protection from electrical hazards.

Another class of protective headgear on the market is called a “bump hat,” designed for use in areas with low head clearance. They are recommended for areas where protection is needed from head bumps and lacerations. These are not designed to protect against falling or flying objects and are not ANSI approved. It is essential to check the type of hard hat employees are using to ensure that the equipment provides appropriate protection. Each hat should bear a label inside the shell that lists the manufacturer, the ANSI designation and the class of the hat.

Size and Care Considerations

Head protection that is either too large or too small is inappropriate for use, even if it meets all other requirements. Protective headgear must fit appropriately on the body and for the head size of each individual. Most protective headgear comes in a variety of sizes with adjustable headbands to ensure a proper fit (many adjust in 1/8-inch increments). A proper fit should allow sufficient clearance between the shell and the suspension system for ventilation and distribution of an impact. The hat should not bind, slip, fall off or irritate the skin.

Some protective headgear allows for the use of various accessories to help employees deal with changing environmental conditions, such as slots for earmuffs, safety glasses, face shields and mounted lights. Optional brims may provide additional protection from the sun and some hats have channels that guide rainwater away from the face. Protective headgear accessories must not compromise the safety elements of the equipment.

Periodic cleaning and inspection will extend the useful life of protective headgear. A daily inspection of the hard hat shell, suspension system and other accessories for holes, cracks, tears or other damage that might compromise the protective value of the hat is essential. Paints, paint thinners and some cleaning agents can weaken the shells of hard hats and may eliminate electrical resistance. Consult the helmet manufacturer for information on the effects of paint and cleaning materials on their hard hats. Never drill holes, paint or apply labels to protective headgear as this may reduce the integrity of the protection. Do not store protective headgear in direct sunlight, such as on the rear window shelf of a car, since sunlight and extreme heat can damage them.

Hard hats with any of the following defects should be removed from service and replaced:

- ? Perforation, cracking, or deformity of the brim or shell;
- ? Indication of exposure of the brim or shell to heat, chemicals or ultraviolet light and other radiation (in addition to a loss of surface gloss, such signs include chalking or flaking).

Always replace a hard hat if it sustains an impact, even if damage is not noticeable. Suspension systems are offered as replacement parts and should be replaced when damaged or when excessive wear is noticed. It is not necessary to replace the entire hard hat when deterioration or tears of the suspension systems are noticed.

Foot and Leg Protection

Employees who face possible foot or leg injuries from falling or rolling objects or from crushing or penetrating materials should

wear protective footwear. Also, employees whose work involves exposure to hot substances or corrosive or poisonous materials must have protective gear to cover exposed body parts, including legs and feet. If an employee's feet may be exposed to electrical hazards, non-conductive footwear should be worn. On the other hand, workplace exposure to static electricity may necessitate the use of conductive footwear.

Examples of situations in which an employee should wear foot and/or leg protection include:

- ? When heavy objects such as barrels or tools might roll onto or fall on the employee's feet;
Working with sharp objects such as nails or spikes that could pierce the soles or uppers of ordinary shoes;
Exposure to molten metal that might splash on feet or legs;
Working on or around hot, wet or slippery surfaces; and
- ? Working when electrical hazards are present.

Safety footwear must meet ANSI minimum compression and impact performance standards in ANSI Z41-1991 (American National Standard for Personal Protection-Protective Footwear) or provide equivalent protection. Footwear purchased before July 5, 1994, must meet or provide equivalent protection to the earlier ANSI Standard (ANSI Z41.1-1967). All ANSI approved footwear has a protective toe and offers impact and compression protection. But the type and amount of protection is not always the same. Different footwear protects in different ways. Check the product's labeling or consult the manufacturer to make sure the footwear will protect the user from the hazards they face.

Foot and leg protection choices include the following:

- ? **Leggings** protect the lower legs and feet from heat hazards such as molten metal or welding sparks. Safety snaps allow leggings to be removed quickly.
- ? **Metatarsal guards** protect the instep area from impact and compression. Made of aluminum, steel, fiber or plastic, these guards may be strapped to the outside of shoes.
- ? **Toe guards** fit over the toes of regular shoes to protect the toes from impact and compression hazards. They may be made of steel, aluminum or plastic.
- ? **Combination foot and shin guards** protect the lower legs and feet, and may be used in combination with toe guards when greater protection is needed.
- ? **Safety shoes** have impact-resistant toes and heat-resistant soles that protect the feet against hot work surfaces common in roofing, paving and hot metal industries. The metal insoles of some safety shoes protect against puncture wounds. Safety shoes may also be designed to be electrically conductive to prevent the buildup of static electricity in areas with the potential for explosive atmospheres or nonconductive to protect workers from workplace electrical hazards.

Special Purpose Shoes

Electrically conductive shoes provide protection against the buildup of static electricity. Employees working in explosive and hazardous locations such as explosives manufacturing facilities or grain elevators must wear conductive shoes to reduce the risk of static electricity buildup on the body that could produce a spark and cause an explosion or fire. Foot powder should not be used in conjunction with protective conductive footwear because it provides insulation, reducing the conductive ability of the shoes. Silk, wool and nylon socks can produce static electricity and should not be worn with conductive footwear. Conductive shoes must be removed when the task requiring their use is completed. Note: Employees exposed to electrical hazards must never wear conductive shoes.

Electrical hazard, safety-toe shoes are nonconductive and will prevent the wearers' feet from completing an electrical circuit to the ground. These shoes can protect against open circuits of up to 600 volts in dry conditions and should be used in conjunction with other insulating equipment and additional precautions to reduce the risk of a worker becoming a path for hazardous electrical energy. The insulating protection of electrical hazard, safety-toe shoes may be compromised if the shoes become wet, the soles are worn through, metal particles become embedded in the sole or heel, or workers touch conductive, grounded items. Note: Nonconductive footwear must not be used in explosive or hazardous locations.

Foundry Shoes

In addition to insulating the feet from the extreme heat of molten metal, foundry shoes keep hot metal from lodging in shoe eyelets, tongues or other shoe parts. These snug-fitting leather or leather-substitute shoes have leather or rubber soles and rubber heels. All foundry shoes must have built-in safety toes.

Care of Protective Footwear

As with all protective equipment, safety footwear should be inspected prior to each use. Shoes and leggings should be checked for wear and tear at reasonable intervals. This includes looking for cracks or holes, separation of materials, broken buckles or laces. The soles of shoes should be checked for pieces of metal or other embedded items that could present electrical or tripping hazards. Employees should follow the manufacturers' recommendations for cleaning and maintenance of protective footwear.

Hand and Arm Protection

If a workplace hazard assessment reveals that employees face potential injury to hands and arms that cannot be eliminated through engineering and work practice controls, employers must ensure that employees wear appropriate protection. Potential hazards include skin absorption of harmful substances, chemical or thermal burns, electrical dangers, bruises, abrasions, cuts, punctures, fractures and amputations. Protective equipment includes gloves, finger guards and arm coverings or elbow-length gloves.

Employers should explore all possible engineering and work practice controls to eliminate hazards and use PPE to provide additional protection against hazards that cannot be completely eliminated through other means. For example, machine guards may eliminate a hazard. Installing a barrier to prevent workers from placing their hands at the point of contact between a table saw blade and the item being cut is another method.

Types of Protective Gloves

There are many types of gloves available today to protect against a wide variety of hazards. The nature of the hazard and the operation involved will affect the selection of gloves. The variety of potential occupational hand injuries makes selecting the right pair of gloves challenging. It is essential that employees use gloves specifically designed for the hazards and tasks found in their workplace because gloves designed for one function may not protect against a different function even though they may appear to be an appropriate protective device.

The following are examples of some factors that may influence the selection of protective gloves for a workplace.

- ? Type of chemicals handled.
- ? Nature of contact (total immersion, splash, etc.).
- ? Duration of contact.
- ? Area requiring protection (hand only, forearm, arm).
- ? Grip requirements (dry, wet, oily).
- ? Thermal protection.
- ? Size and comfort.
- ? Abrasion/resistance requirements.
- ? Gloves made from a wide variety of materials are designed for many types of workplace hazards. In general, gloves fall into four groups:
 - ? Gloves made of leather, canvas or metal mesh;
 - ? Fabric and coated fabric gloves;

- ? Chemical- and liquid-resistant gloves;
- ? Insulating rubber gloves (See 29 CFR 1910.137 and the following section on electrical protective equipment for detailed requirements on the selection, use and care of insulating rubber gloves).

Leather, Canvas or Metal Mesh Gloves

Sturdy gloves made from metal mesh, leather or canvas provide protection against cuts and burns. Leather or canvas gloves also protect against sustained heat.

- ? **Leather gloves** protect against sparks, moderate heat, blows, chips and rough objects.
- ? **Aluminized gloves** provide reflective and insulating protection against heat and require an insert made of synthetic materials to protect against heat and cold.
- ? **Aramid fiber gloves** protect against heat and cold, are cut - and abrasive - resistant and wear well.
- ? **Synthetic gloves** of various materials offer protection against heat and cold, are cut - and abrasive - resistant and may withstand some diluted acids. These materials do not stand up against alkalis and solvents.

Fabric and Coated Fabric Gloves

Fabric and coated fabric gloves are made of cotton or other fabric to provide varying degrees of protection.

- ? **Fabric gloves** protect against dirt, slivers, chafing and abrasions. They do not provide sufficient protection for use with rough, sharp or heavy materials. Adding a plastic coating will strengthen some fabric gloves.
- ? **Coated fabric gloves** are normally made from cotton flannel with napping on one side. By coating the unnapped side with plastic, fabric gloves are transformed into general-purpose hand protection offering slip-resistant qualities. These gloves are used for tasks ranging from handling bricks and wire to chemical laboratory containers. When selecting gloves to protect against chemical exposure hazards, always check with the manufacturer or review the manufacturer's product literature to determine the gloves' effectiveness against specific workplace chemicals and conditions.

Chemical - and Liquid - Resistant Gloves

Chemical-resistant gloves are made with different kinds of rubber: natural, butyl, neoprene, nitrile and fluorocarbon (viton); or various kinds of plastic: polyvinyl chloride (PVC), polyvinyl alcohol and polyethylene. These materials can be blended or laminated for better performance. As a general rule, the thicker the glove material, the greater the chemical resistance but thick gloves may impair grip and dexterity, having a negative impact on safety.

Some examples of chemical-resistant gloves include:

- ? **Butyl gloves** are made of a synthetic rubber and protect against a wide variety of chemicals, such as peroxide, rocket fuels, highly corrosive acids (nitric acid, sulfuric acid, hydrofluoric acid and red-fuming nitric acid), strong bases, alcohols, aldehydes, ketones, esters and nitrocompounds. Butyl gloves also resist oxidation, ozone corrosion and abrasion, and remain flexible at low temperatures. Butyl rubber does not perform well with aliphatic and aromatic hydrocarbons and halogenated solvents.
- ? **Natural (latex) rubber gloves** are comfortable to wear, which makes them a popular general-purpose glove. They feature outstanding tensile strength, elasticity and temperature resistance. In addition to resisting abrasions caused by grinding and polishing, these gloves protect workers' hands from most water solutions of acids, alkalis, salts and ketones. Latex gloves have caused allergic reactions in some individuals and may not be appropriate for all employees. Hypoallergenic gloves, glove liners and powderless gloves are possible alternatives for workers who are allergic to latex gloves.
- ? **Neoprene gloves** are made of synthetic rubber and offer good pliability, finger dexterity, high density and tear resistance. They protect against hydraulic fluids, gasoline, alcohols, organic acids and alkalis. They generally have chemical and wear resistance properties superior to those made of natural rubber.
- ? **Nitrile gloves** are made of a copolymer and provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene. Although intended for jobs requiring dexterity and

sensitivity, nitrile gloves stand up to heavy use even after prolonged exposure to substances that cause other gloves to deteriorate. They offer protection when working with oils, greases, acids, caustics and alcohols but are generally not recommended for use with strong oxidizing agents, aromatic solvents, ketones and acetates.

The following table from the U.S. Department of Energy (Occupational Safety and Health Technical Reference Manual) rates various gloves as being protective against specific chemicals and will help you select the most appropriate gloves to protect your employees. The ratings are abbreviated as follows: VG: Very Good;

G: Good; F: Fair; P: Poor (not recommended). Chemicals marked with an asterisk (*) are for limited service.

Table 4
Chemical Resistance Selection Chart for Protective Gloves

Chemical	Neoprene	Latex/Rubber	Butyl	Nitrile
Acetaldehyde*	VG	G	VG	G
Acetic acid	VG	VG	VG	VG
Acetone*	G	VG	VG	P
Ammonium hydroxide	VG	VG	VG	VG
Amy acetate*	F	P	F	P
Aniline	G	F	F	P
Benzaldehyde*	F	F	G	G
Benzene*	P	P	P	F
Butyl acetate	G	F	F	P
Butyl alcohol	VG	VG	VG	VG
Carbon disulfide	F	F	F	F
Carbon tetrachloride*	F	P	P	G
Castor oil	F	P	F	VG
Chlorobenzene*	F	P	F	P
Chloroform*	G	P	P	F
Chloronaphthalene	F	P	F	F
Chromic acid (50%)	F	P	F	F
Citric acid (10%)	VG	VG	VG	VG
Cyclohexanol	G	F	G	VG
Dibutyl phthalate*	G	P	G	G
Diesel fuel	G	P	P	VG
Diisobutyl ketone	P	F	G	P
Dimethylformamide	F	F	G	G
Diocetyl phthalate	G	P	F	VG

Dioxane	VG	G	G	G
Epoxy resins, dry	VG	VG	VG	VG
Ethyl acetate*	G	F	G	F
Ethyl alcohol	VG	VG	VG	VG
Ethyl ether*	VG	G	VG	G
Ethylene dichloride*	F	P	F	P
Ethylene glycol	VG	VG	VG	VG
Formaldehyde	VG	VG	VG	VG
Formic acid	VG	VG	VG	VG
Freon 11	G	P	F	G
Freon 12	G	P	F	G
Freon 21	G	P	F	G
Freon 22	G	P	F	G
Furfural*	G	G	G	G
Gasoline, leaded	G	P	F	VG
Gasoline, unleaded	G	P	F	VG
Glycerin	VG	VG	VG	VG
Hexane	F	P	P	G
Hydrazine (65%)	F	G	G	G
Hydrochloric acid	VG	G	G	G
Hydrofluoric acid (48%)	VG	G	G	G
Hydrogen peroxide (30%)	G	G	G	G
Hydroquinone	G	G	G	F
Isooctane	F	P	P	VG
Kerosene	VG	F	F	VG
Ketones	G	VG	VG	P
Lacquer thinners	G	F	F	P
Lactic acid (85%)	VG	VG	VG	VG
Lauric acid (36%)	VG	F	VG	VG
Lineolic acid	VG	P	F	G
Linseed oil	VG	P	F	VG
Maleic acid	VG	VG	VG	VG
Methyl alcohol	VG	VG	VG	VG
Methylamine	F	F	G	G

Methyl bromide	G	F	G	F
Methyl chloride*	P	P	P	P
Methyl ethyl ketone*	G	G	VG	P
Methyl isobutyl ketone*	F	F	VG	P
Methyl methacrylate	G	G	VG	F
Monoethanolamine	VG	G	VG	VG
Morpholine	VG	VG	VG	G
Naphthalene	G	F	F	G
Napthas, aliphatic	VG	F	F	VG
Napthas, aromatic	G	P	P	G
Nitric acid*	G	F	F	F
Nitric acid, red and white fuming	P	P	P	P
Nitromethane (95.5%)*	F	P	F	F
Nitropropane (95.5%)	F	P	F	F
Octyl alcohol	VG	VG	VG	VG
Oleic acid	VG	F	G	VG
Oxalic acid	VG	VG	VG	VG
Palmitic acid	VG	VG	VG	VG
Perchloric acid (60%)	VG	F	G	G
Perchloroethylene	F	P	P	G
Petroleum distillates (naphtha)	G	P	P	VG
Phenol	VG	F	G	F
Phosphoric acid	VG	G	VG	VG
Potassium hydroxide	VG	VG	VG	VG
Propyl acetate	G	F	G	F
Propyl alcohol	VG	VG	VG	VG
Propyl alcohol (iso)	VG	VG	VG	VG
Sodium hydroxide	VG	VG	VG	VG
Styrene	P	P	P	F
Styrene (100%)	P	P	P	F
Sulfuric acid	G	G	G	G
Tannic acid (65)	VG	VG	VG	VG
Tetrahydrofuran	P	F	F	F
Toluene*	F	P	P	F

Toluene diisocyanate (TDI)	F	G	G	F
Trichloroethylene*	F	F	P	G
Triethanolamine (85%)	VG	G	G	VG
Tung oil	VG	P	F	VG
Turpentine	G	F	F	VG
Xylene*	P	P	P	F

Note: When selecting chemical-resistant gloves be sure to consult the manufacturer's recommendations, especially if the gloved hand(s) will be immersed in the chemical.

Care of Protective Gloves

Protective gloves should be inspected before each use to ensure that they are not torn, punctured or made ineffective in any way. A visual inspection will help detect cuts or tears but a more thorough inspection by filling the gloves with water and tightly rolling the cuff towards the fingers will help reveal any pinhole leaks. Gloves that are discolored or stiff may also indicate deficiencies caused by excessive use or degradation from chemical exposure.

Any gloves with impaired protective ability should be discarded and replaced. Reuse of chemical-resistant gloves should be evaluated carefully, taking into consideration the absorptive qualities of the gloves. A decision to reuse chemically-exposed gloves should take into consideration the toxicity of the chemicals involved and factors such as duration of exposure, storage and temperature.

Body Protection

Employees who face possible bodily injury of any kind that cannot be eliminated through engineering, work practice or administrative controls, must wear appropriate body protection while performing their jobs. In addition to cuts and radiation, the following are examples of workplace hazards that could cause bodily injury:

- ? Temperature extremes;
- ? Hot splashes from molten metals and other hot liquids;
- ? Potential impacts from tools, machinery and materials;
- ? Hazardous chemicals.

There are many varieties of protective clothing available for specific hazards. Employers are required to ensure that their employees wear personal protective equipment only for the parts of the body exposed to possible injury. Examples of body protection include laboratory coats, coveralls, vests, jackets, aprons, surgical gowns and full body suits.

If a hazard assessment indicates a need for full body protection against toxic substances or harmful physical agents, the clothing should be carefully inspected before each use, it must fit each worker properly and it must function properly and for the purpose for which it is intended.

Protective clothing comes in a variety of materials, each effective against particular hazards, such as:

- ? **Paper-like fiber** used for disposable suits provide protection against dust and splashes.
- ? **Treated wool and cotton** adapts well to changing temperatures, is comfortable, and fire-resistant and protects against dust, abrasions and rough and irritating surfaces.
- ? **Duck** is a closely woven cotton fabric that protects against cuts and bruises when handling heavy, sharp or rough materials.

- ? **Leather** is often used to protect against dry heat and flames.
- ? **Rubber, rubberized fabrics, neoprene and plastics** protect against certain chemicals and physical hazards. When chemical or physical hazards are present, check with the clothing manufacturer to ensure that the material selected will provide protection against the specific hazard.

Hearing Protection

Determining the need to provide hearing protection for employees can be challenging. Employee exposure to excessive noise depends upon a number of factors, including:

- ? The loudness of the noise as measured in decibels (dB).
- ? The duration of each employee's exposure to the noise.
- ? Whether employees move between work areas with different noise levels.
- ? Whether noise is generated from one or multiple sources.

Generally, the louder the noise, the shorter the exposure time before hearing protection is required. For instance, employees may be exposed to a noise level of 90 dB for 8 hours per day (unless they experience a Standard Threshold Shift) before hearing protection is required. On the other hand, if the noise level reaches 115 dB hearing protection is required if the anticipated exposure exceeds 15 minutes.

For a more detailed discussion of the requirements for a comprehensive hearing conservation program, see OSHA Publication 3074 (2002), "Hearing Conservation" or refer to the OSHA standard at 29 CFR 1910.95, Occupational Noise Exposure, section (c).

Table 5, below, shows the permissible noise exposures that require hearing protection for employees exposed to occupational noise at specific decibel levels for specific time periods. Noises are considered continuous if the interval between occurrences of the maximum noise level is one second or less. Noises not meeting this definition are considered impact or impulse noises (loud momentary explosions of sound) and exposures to this type of noise must not exceed 140 dB. Examples of situations or tools that may result in impact or impulse noises are powder-actuated nail guns, a punch press or drop hammers.

Table 5
Permissible Noise Exposures 1/4 or less 115

Duration per day, in hours	Sound level in dB*
8	90
6	92
4	95
3	97
2	100
1 1/2 5	102
1	105
1/2	110
1/4 or less	115

*When measured on the A scale of a standard sound level meter at slow response.
Source: 29 CFR 1910.95, Table G-16.

If engineering and work practice controls do not lower employee exposure to workplace noise to acceptable levels, employees must wear appropriate hearing protection. It is important to understand that hearing protectors reduce only the amount of noise that gets through to the ears. The amount of this reduction is referred to as attenuation, which differs according to the type of hearing protection used and how well it fits. Hearing protectors worn by employees must reduce an employee's noise exposure to within the acceptable limits noted in Table 5. Refer to Appendix B of 29 CFR 1910.95, Occupational Noise Exposure, for detailed information on methods to estimate the attenuation effectiveness of hearing protectors based on the device's noise reduction rating (NRR). Manufacturers of hearing protection devices must display the device's NRR on the product packaging. If employees are exposed to occupational noise at or above 85 dB averaged over an eight-hour period, the employer is required to institute a hearing conservation program that includes regular testing of employees' hearing by qualified professionals. Refer to 29 CFR 1910.95(c) for a description of the requirements for a hearing conservation program.

Some types of hearing protection include:

- ? **Single-use earplugs** are made of waxed cotton, foam, silicone rubber or fiberglass wool. They are self-forming and, when properly inserted, they work as well as most molded earplugs.
- ? **Pre-formed or molded earplugs** must be individually fitted by a professional and can be disposable or reusable. Reusable plugs should be cleaned after each use.
- ? **Earmuffs** require a perfect seal around the ear. Glasses, facial hair, long hair or facial movements such as chewing may reduce the protective value of earmuffs.

OSHA Assistance

OSHA can provide extensive help through a variety of programs, including technical assistance about effective safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, training and education, and more. An overall commitment to workplace safety and health can add value to your business, to your workplace and to your life.

Safety and Health Program Management Guidelines

Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. In fact, an effective safety and health program forms the basis of good worker protection and can save time and money (about \$4 for every dollar spent) and increase productivity and reduce worker injuries, illnesses and related workers' compensation costs.

To assist employers and employees in developing effective safety and health programs, OSHA published recommended Safety and Health Program Management Guidelines (Federal Register 54 (16): 3904-3916, January 26, 1989). These voluntary guidelines apply to all places of employment covered by OSHA.

The guidelines identify four general elements critical to the development of a successful safety and health management program:

- ? Management leadership and employee involvement.
- ? Work analysis.
- ? Hazard prevention and control.
- ? Safety and health training.

The guidelines recommend specific actions, under each of these general elements, to achieve an effective safety and health program. The Federal Register notice is available online at www.osha.gov.

State Programs

The Occupational Safety and Health Act of 1970 (OSH Act) encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans. There are currently 26 state

plans: 23 cover both private and public (state and local government) employment; 3 states, Connecticut, New Jersey and New York, cover the public sector only. States and territories with their own OSHA-approved occupational safety and health plans must adopt standards identical to, or at least as effective as, the federal standards.

Consultation Services

Consultation assistance is available on request to employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. Primarily developed for smaller employers with more hazardous operations, the consultation service is delivered by state governments employing professional safety and health consultants. Comprehensive assistance includes an appraisal of all-mechanical systems, work practices and occupational safety and health hazards of the workplace and all aspects of the employer's present job safety and health program. In addition, the service offers assistance to employers in developing and implementing an effective safety and health program. No penalties are proposed or citations issued for hazards identified by the consultant. OSHA provides consultation assistance to the employer with the assurance that his or her name and firm and any information about the workplace will not be routinely reported to OSHA enforcement staff.

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation in SHARP includes receiving a comprehensive consultation visit, demonstrating exemplary achievements in workplace safety and health by abating all identified hazards and developing an excellent safety and health program.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for a period of one year. For more information concerning consultation assistance, see the OSHA website at www.osha.gov.

Voluntary Protection Programs (VPP)

Voluntary Protection Programs and onsite consultation services, when coupled with an effective enforcement program, expand worker protection to help meet the goals of the OSH Act. The three levels of VPP are Star, Merit, and Demonstration designed to recognize outstanding achievements by companies that have successfully incorporated comprehensive safety and health programs into their total management system. The VPPs motivate others to achieve excellent safety and health results in the same outstanding way as they establish a cooperative relationship between employers, employees and OSHA.

For additional information on VPP and how to apply, contact the OSHA regional offices listed at the end of this publication.

Strategic Partnership Program

OSHA's Strategic Partnership Program, the newest member of OSHA's cooperative programs, helps encourage, assist and recognize the efforts of partners to eliminate serious workplace hazards and achieve a high level of worker safety and health. Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships seek to have a broader impact by building cooperative relationships with groups of employers and employees. These partnerships are voluntary, cooperative relationships between OSHA, employers, employee representatives and others (e.g., trade unions, trade and professional associations, universities and other government agencies).

For more information on this and other cooperative programs, contact your nearest OSHA office, or visit OSHA's website at www.osha.gov.

Alliance Programs

The Alliance Program enables organizations committed to workplace safety and health to collaborate with OSHA to prevent injuries and illnesses in the workplace. OSHA and the Alliance participants work together to reach out to, educate and lead the nation's employers and their employees in improving and advancing workplace safety and health.

Alliances are open to all groups, including trade or professional organizations, businesses, labor organizations, educational institutions and government agencies. In some cases, organizations may be building on existing relationships with OSHA that were developed through other cooperative programs.

There are few formal program requirements for Alliances and the agreements do not include an enforcement component. However, OSHA and the participating organizations must define, implement and meet a set of short- and long-term goals that fall into three categories: training and education; outreach and communication; and promoting the national dialogue on workplace safety and health.

OSHA Training and Education

OSHA area offices offer a variety of information services, such as compliance assistance, technical advice, publications, audiovisual aids and speakers for special engagements. OSHA's Training Institute in Arlington Heights, Ill., provides basic and advanced courses in safety and health for federal and state compliance officers, state consultants, federal agency personnel, and private sector employers, employees and their representatives.

The OSHA Training Institute also has established OSHA Training Institute Education Centers to address the increased demand for its courses from the private sector and from other federal agencies. These centers are nonprofit colleges, universities and other organizations that have been selected after a competition for participation in the program.

OSHA also provides funds to nonprofit organizations, through grants, to conduct workplace training and education in subjects where OSHA believes there is a lack of workplace training. Grants are awarded annually. Grant recipients are expected to contribute 20 percent of the total grant cost.

Information Available Electronically

OSHA has a variety of materials and tools available on its website at www.osha.gov. These include e-Tools such as Expert Advisors, Electronic Compliance Assistance Tools (e-cats), Technical Links; regulations, directives and publications, videos and other information for employers and employees. OSHA's software programs and compliance assistance tools walk you through challenging safety and health issues and common problems to find the best solutions for your workplace.

Contacting OSHA

To report an emergency, file a complaint or seek OSHA advice, assistance or products, call (800) 321-OSHA or contact your nearest OSHA regional or area office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889-5627.

You can also file a complaint online and obtain more information on OSHA federal and state programs by visiting OSHA's website at www.osha.gov.



Respiratory Protection

This informational booklet provides a generic, non-exhaustive overview of a particular topic related to OSHA standards. It does not alter or determine compliance responsibilities in OSHA standards or the *Occupational Safety and Health Act of 1970*. Because interpretations and enforcement policy may change over time, you should consult current administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the Courts for additional guidance on OSHA compliance requirements.

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This information is available to sensory impaired individuals upon request. Voice phone: (202) 693-1999; Teletypewriter (TTY) number: (877) 889-5627.

Respiratory Protection

U.S. Department of Labor
Elaine L. Chao, Secretary

Occupational Safety and Health Administration
John L. Henshaw, Assistant Secretary

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Respiratory Protection

What is a respirator?

A respirator is a protective device that covers the nose and mouth or the entire face or head to guard the wearer against hazardous atmospheres. Respirators may be:

- ? Tight-fitting - that is, half masks, which cover the mouth and nose and full facepieces that cover the face from the hairline to below the chin; or
- ? Loose-fitting, such as hoods or helmets that cover the head completely.
- ? In addition, there are two major classes of respirators:
 - ? Air-purifying, which remove contaminants from the air; and
 - ? Atmosphere-supplying, which provide clean, breathable air from an uncontaminated source. As a general rule, atmosphere-supplying respirators are used for more hazardous exposures.

Why do employees need respirators?

When employees must work in environments with insufficient oxygen or where harmful dusts, fogs, smokes, mists, fumes, gases, vapors, or sprays are present, they need respirators. These health hazards may cause cancer, lung impairment, other diseases, or death.

Where toxic substances are present in the workplace and engineering controls are inadequate to reduce or eliminate them, respirators are necessary. Some atmosphere-supplying respirators can also be used to protect against oxygen-deficient atmospheres. Increased breathing rates, accelerated heartbeat, and impaired thinking or coordination occur more quickly in an oxygen-deficient or other hazardous atmosphere. Even a momentary loss of coordination can be devastating if it occurs while a worker is performing a potentially dangerous activity such as climbing a ladder.

When do employees need to wear respirators?

Employees need to wear respirators whenever engineering and work practice control measures are not adequate to prevent atmospheric contamination at the worksite. Strategies for preventing atmospheric contamination may include enclosing or confining the contaminant-producing operation, exhausting the contaminant, or substituting with less toxic materials.

Respirators have their limitations and are not a substitute for effective engineering and work practice controls. When it is not possible to use these controls to reduce airborne contaminants below their occupational exposure levels, such as during certain maintenance and repair operations, emergencies, or when engineering controls are being installed, respirator use may be the best or only way to reduce worker exposure. In other cases, where work practices and engineering controls alone cannot reduce exposure levels to below the occupational exposure level, respirator use is essential.

Where respirators are required to protect worker health, specific procedures are necessary to ensure the equipment's effectiveness.

How can you ensure proper protection?

OSHA's respirator standard¹ requires employers to establish and maintain an effective respiratory protection program when employees must wear respirators to protect against workplace hazards. Different hazards require different respirators, and employees are responsible for wearing the appropriate respirator and complying with the respiratory protection program.

The standard contains requirements for program administration, worksite-specific procedures, respirator selection, employee training, fit testing, medical evaluation, and respirator use, cleaning, maintenance, and repair.

Employees must use respirators while effective engineering controls, if they are feasible, are being installed. If engineering controls are not feasible, employers must provide respirators and employees must wear them when necessary to protect their health. The employee's equipment must be properly selected, used, and maintained for a particular work environment and contaminant. In addition, employers must train employees in all aspects of the respiratory protection program.

¹ OSHA's regulations cover general, construction, and maritime industries. See *Title 29 of the Code of Federal Regulations (CFR)*, Part 1910.134; and the Compressed Gas Association's Commodity Specification G-7-1989, also referenced in 29 *CFR* Part 1910.134.

Procedures to Ensure Proper Protection

How do you develop an effective respiratory protection program?

The primary objective of the respiratory protection program is to prevent exposure to air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, vapors, or sprays, and thus to prevent occupational illness.

A program administrator must be responsible for the program. This person must know enough about respirators to supervise the program properly.

Larger plants or companies with industrial hygiene, in-house medical department, safety engineering, or fire prevention departments should administer the program in liaison with the program administrator. In smaller plants without specialists, an upper-level superintendent, foreman, or qualified person must serve as program administrator.

Any respirator program should stress thorough training of all respirator users. Employees must be aware that a respirator does not eliminate the hazard. If the respirator fails, the user will be overexposed to dangerous substances. To reduce the possibility of failure, the respirator must fit properly and be maintained in a clean and serviceable condition.

Employers and employees must understand the respirator's purpose and limitations. Users must not alter or remove the respirator even for a short time, even if it is uncomfortable.

An effective respirator program must cover the following factors:

- ? Written worksite specific procedures;
- ? Program evaluation;
- ? Selection of an appropriate respirator approved by the National Institute for Occupational Safety and Health (NIOSH);
- ? Training;
- ? Fit testing;
- ? Inspection, cleaning, maintenance, and storage;

- ? Medical evaluations;
- ? Work area surveillance; and
- ? Air quality standards.

Whenever OSHA standards or employers require respirator use, there must be a complete respiratory protection program. Employers must have written operating procedures to ensure that employees use the respirators safely and properly. Users must be familiar with these procedures and with the respirators available and their limitations.

In workplaces with no hazardous exposures, but where workers choose to use respirators voluntarily, certain written program elements may be necessary to prevent potential hazards associated with respirator use. Employers must evaluate whether respirator use itself may actually *harm* employees. If so, employers must medically evaluate employees and, if necessary, restrict respirator use, as well as comply with program elements. Employers must inform employees voluntarily using respirators of basic information in Appendix D of OSHA's respiratory protection standard.

Employers must evaluate the effectiveness of a company's respirator program regularly and modify the written operating procedure as necessary to reflect the evaluation results. A labor-management team may be effective in conducting these periodic evaluations.

How do you choose the correct respirator?

Choosing the right equipment involves:

- ? Determining what the hazard is and its extent,
- ? Considering user factors that affect respirator performance and reliability, and
- ? Selecting an appropriate NIOSH-certified respirator.

Equipment must be used in line with specifications accompanying the NIOSH certification.

When selecting respirators, employers must consider the chemical and physical properties of the contaminant, as well as the toxicity and concentration of the hazardous material and the amount of oxygen present. Other selection factors are nature and extent of the hazard, work rate, area to be covered, mobility, work requirements and conditions, as well as the limitations and characteristics of the available respirators.

Air-purifying respirators use filters or sorbents to remove harmful substances from the air. They range from simple disposable masks to sophisticated devices. They do not supply oxygen and must not be used in oxygen-deficient atmospheres or in other atmospheres that are immediately dangerous to life or health (IDLH).

Atmosphere-supplying respirators are designed to provide breathable air from a clean air source other than the surrounding contaminated work atmosphere. They include supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

The time needed to perform a given task, including the time necessary to enter and leave a contaminated area, is an important factor in determining the type of respiratory protection needed. For example, SCBAs, gas masks, or air-purifying chemical-cartridge respirators provide respiratory protection for relatively short periods. On the other hand, an atmosphere-supplying respirator that supplies breathable air from an air compressor through an air line can provide protection for extended periods.

If the total concentration of atmospheric particulates is low, particulate filter air-purifying respirators can provide protection for long periods without the need to replace the filter. Where there are higher concentrations of contaminants, however, an atmosphere-supplying respirator such as the positive-pressure SAR offers better protection for a longer period.

SARs eliminate the need for concern about filter breakthrough times, change schedules, or using end-of-service-life indicators (ESLI) for airborne toxic materials, factors that must be considered when using air-

purifying respirators.

Respirators must not impair the worker's ability to see, hear, communicate, and move as necessary to perform the job safely. For example, atmosphere-supplying respirators may restrict movement and present other potential hazards. SARs with their trailing hoses can limit the area the wearer can cover and may present a hazard if the hose comes into contact with machinery. Similarly, a SCBA that includes a back-mounted, compressed-air cylinder is both large and heavy. This may restrict climbing and movement in tight places, and the added weight of the air cylinder presents an additional burden to the wearer.

Another factor to consider when using respirators is the air-supply rate. The wearer's work rate determines the volume of air breathed per minute. The volume of air supplied to meet the breathing requirements is very significant when using atmosphere-supplying respirators such as self-contained and airline respirators that use cylinders because this volume determines their operating life.

The peak airflow rate also is important in the use of a constant-flow SAR. The air-supply rate should always be greater than the maximum amount of air being inhaled in order to maintain the respiratory enclosure under positive pressure.

Higher breathing resistance of air-purifying respirators under conditions of heavy work may cause the user breathing difficulty, particularly in hot, humid conditions. To avoid placing additional stress on the wearer, use the lightest respirator possible that presents the least breathing resistance.

SCBAs and some chemical canister respirators provide a warning of remaining service time. This may be a pressure gauge or timer with an audible alarm for SCBAs or a color ESLI on the cartridge or canister. The user should understand the operation and limitations of each type of warning device. For the many gas masks and chemical-cartridge respirators with no ESLI devices, the employer must establish and enforce a cartridge or canister change schedule. In addition, employees should begin each work shift with new canisters and cartridges.

What are specific respirator uses?

The following list presents a simplified version of characteristics and factors used for respirator selection. It does not specify the contaminant concentrations or particle size. Some OSHA substance-specific standards include more detailed information on respirator selection.

Hazard	Respirator
<i>Immediately dangerous to life or health (IDLH) 2</i>	
Oxygen deficiency	Full-facepiece, pressure-demand SCBA certified for a minimum service life of 30 minutes. A combination full-facepiece, pressure-demand SAR with an auxiliary self-contained air supply.
Gas, vapor contaminants and other highly toxic air contaminants	
Contaminated atmospheres - for escape	Positive-pressure SCBA. Gas mask. Combination positive-pressure SAR with escape SCBA.
<i>Not immediately dangerous to life or health</i>	
Gas and vapor contaminants	Positive-pressure SAR. Gas mask. Chemical-cartridge or canister respirator.
Particulate contaminants	Positive-pressure SAR including abrasive blasting respirator. Powered air-purifying respirator equipped with high-efficiency filters. Any air-purifying respirator with a specific particulate filter.

Gaseous and particulate contaminants	Positive-pressure supplied respirator. Gas mask. Chemical-cartridge respirator with mechanical filters.
Smoke and other fire-related contaminants	Positive-pressure SCBA.

2 “Immediately dangerous to life or health” (IDLH) means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Who needs to be trained?

Training is essential for correct respirator use. Employers must teach supervisors and workers how to properly select, use, and maintain respirators. All employees required to use respiratory protective equipment must receive instruction in the proper use of the equipment and its limitations. Employers should develop training programs based on the employee's education level and language background.

Training must be comprehensive enough for the employee to demonstrate a knowledge of the limitations and capabilities of the respirator, why the respirator is necessary, and how improper fit, usage, or maintenance can compromise the respirator.

Training must include an explanation of the following:

- ? Why respirator use is necessary;
- ? Nature of the respiratory hazard and consequences of not fitting, using, and maintaining the respirator properly;
- ? Reason(s) for selecting a particular type of respirator;
- ? Capabilities and limitations of the selected respirator;
- ? How to inspect, put on and remove, and check the seals of the respirator;
- ? Respirator maintenance and storage requirements;
- ? How to use the respirator effectively in emergency situations, including when the respirator malfunctions; and
- ? How to recognize medical signs and symptoms that may limit or prevent the effective use of the respirator.

Users should know that improper respirator use or maintenance may cause overexposure. They also should understand that continued use of poorly fitted and maintained respirators can cause chronic disease or death from overexposure to air contaminants.

How do you make sure the respirators fit properly?

Different types of respirators and even different brands of the same type of respirator have different fit characteristics. No one respirator will fit everyone. Some employees may be unable to get an adequate fit with certain respirator models of a particular type of respirator. This is why employers must provide a sufficient number of respirator models and sizes to ensure that every employee can select an acceptable respirator that fits properly.

Corrective eyeglasses worn by employees also present a problem when fitting respirators. Special mountings are available to hold corrective lenses inside full facepieces. A qualified individual must fit the facepiece and lenses to provide good vision, comfort, and proper sealing.

Tight-fitting respirators cannot provide proper protection without a tight seal between the facepiece and the wearer's face. Consequently, beards and other facial hair, the absence of normally worn dentures, facial

deformities, or jewelry or head gear that projects under the facepiece seal can also seriously affect the fit of a facepiece. To ensure proper respiratory protection, check the facepiece each time you wear the respirator. You can do this by performing either a positive-pressure or negative-pressure user seal check. Detailed instructions for performing these user seal checks are in Appendix B-1 of the OSHA respiratory protection standard.

Fit testing is required for tight-fitting facepiece respirators. You can test the effectiveness of the fit of the facepiece two ways: qualitatively and quantitatively.

Qualitative fit testing involves the introduction of a harmless odoriferous or irritating substance into the breathing zone around the respirator being worn. If no odor or irritation is detected by the wearer, this indicates a proper fit.

Quantitative fit testing offers more accurate, detailed information on respirator fit. While the wearer performs exercises that could induce facepiece leakage, a fit testing instrument numerically measures the amount of leakage into the respirator. This testing can be done either by generating a test aerosol as a test atmosphere, using ambient aerosol as a test agent, or using controlled negative pressure to measure any leakage. Detailed instructions for performing qualitative and quantitative fit testing is contained in Appendix A of the OSHA respiratory protection standard.

How do you inspect and take care of respirators?

It is important to inspect all respirators for wear and tear before and after each use, giving special attention to rubber or plastic parts that can deteriorate or lose pliability. The facepiece, headband, valves, connecting tube, fittings, and cartridges, canisters or filters must be in good condition. A respirator inspection must include checking the tightness of the connections.

Users must inspect SCBAs at least monthly and ensure that air and oxygen cylinders are fully charged according to the manufacturer's instructions. The inspection should include a check of regulator and warning devices to ensure their proper function. Employers must keep records of inspection dates and findings.

Users should replace chemical cartridges and gas mask canisters as necessary to provide complete protection, following the manufacturer's recommendations. In addition, they should replace mechanical filters as necessary to avoid high resistance to breathing.

Only an experienced person is permitted to make repairs, using parts specifically designed for the respirator. This person must consult the manufacturer's instructions for any repair and no attempt should be made to repair or replace components or make adjustments or repairs beyond the manufacturer's recommendations.

The employer must ensure that respirators are cleaned and disinfected as often as necessary to keep them sanitary. In addition, the employer must ensure that emergency-use respirators are cleaned and disinfected immediately after each use.

Respirators should be washed in a detergent solution and then disinfected by immersing them in a sanitizing solution. Cleaner-sanitizers that effectively clean the respirator and contain a bactericidal agent are available commercially. The bactericidal agent frequently used is a quaternary ammonium compound. Strong cleaning and sanitizing agents and many solvents can damage rubber or plastic respirator parts. Use these materials with caution or after consultation with the respirator manufacturer.

Users must store respirators in a way that protects them against dust, sunlight, heat, extreme cold, excessive moisture, and damaging chemicals. When packed or stored, each respirator should be positioned to retain its natural configuration. Facepieces and exhalation valves should rest in a normal position to prevent the rubber or plastic from deforming.

Do you need to do medical evaluations?

Workers assigned to tasks that require respirator use must be physically able to perform the work while using

the respirator. The local physician or licensed health care professional (LHCP) will determine what health and physical conditions are pertinent.

The medical evaluation can be performed by a physician or other LHCP by using a medical questionnaire or by a medical examination that provides the same information as the questionnaire provided in Appendix C of the OSHA standard. This evaluation must be done before the employee is fit tested and uses the respirator in the workplace. The employer must obtain a written recommendation from the LHCP for each employee's ability to wear a respirator. Additional medical evaluations must be provided whenever health-care professionals deem them appropriate.

How do you monitor work areas?

Employers must maintain surveillance of the work area conditions and the degree of worker exposure or stress - a combination of work rate, environmental conditions, and physiological burdens of wearing a respirator. Changes in operating procedures, temperature, air movement, humidity, and work practices may influence the concentration of a substance in the work area atmosphere. Employers must periodically monitor these factors as they affect air contaminant concentrations. In instances where work is of such short duration that it takes longer to do the test than the job, reasonable estimates of exposure are allowable.

In situations where the environment is or may be immediately dangerous to life or health, employers must ensure that one or more employees are located outside the dangerous environment. These employees must maintain visual, voice, or signal line communication with employees in the IDLH atmosphere.

In interior structural firefighting situations, employers must ensure that at least two employees enter the structure and remain in visual or voice contact with one another at all times. Also, at least two employees must be located outside the fire area to provide effective emergency rescue. All workers engaged in interior structural firefighting must use SCBA.

What equipment and air quality standards apply?

Respiratory protective devices must be approved by NIOSH for the contaminant or situation to which the employee is exposed.

Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration must be of high purity. Oxygen must meet the requirements of the United States Pharmacopoeia for medical or breathable oxygen. Breathing air must meet at least the requirement for Grade D breathing air described in Compressed Gas Association (CGA) Commodity Specification G-7.1-1989. Compressed oxygen must not be used in open circuit SCBAs or SARs that have previously used compressed air. Oxygen concentrations greater than

23.5 percent must not be used with airline respirators unless the equipment is designed for oxygen service.

Employers must supply breathing air to respirators from cylinders or air compressors. For testing cylinders, see "Shipping Container Specifications of the Department of Transportation," 49 *CFR* Part 178.

Employers must mark containers of breathing gas clearly and in accordance with NIOSH requirements, as described in 42 *CFR* Part 84. Further details on the sources of compressed air and its safe use can be found in the CGA pamphlet G-7.1-1989.

The compressor for supplying air must have the necessary safety devices and alarms. Compressors must be constructed and situated to prevent contaminated air from entering the air supply system and be equipped with suitable in-line, air-purifying sorbent beds and filters installed to ensure breathing air quality. If using an oil-lubricated compressor, ensure that it has a high-temperature or carbon monoxide alarm or both. If using only the high-temperature alarm, the employer must test the air from the compressor frequently for carbon monoxide.

Air-line couplings must be incompatible with outlets for other gas systems to prevent accidental servicing of air-line respirators with non-breathable gases or oxygen.

OSHA Assistance, Services, and Programs

How can OSHA help me?

OSHA can provide extensive help through a variety of programs, including assistance about safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, alliances, and training and education. An overall commitment to workplace safety and health can add value to your business, to your workplace, and to your life.

How does safety and health management system assistance help employers and employees?

Working in a safe and healthful environment can stimulate innovation and creativity and result in increased performance and higher productivity. The key to a safe and healthful work environment is a comprehensive safety and health management system.

OSHA has an electronic compliance assistance tool, or eTools, on its website that “walks” users through the steps required to develop a comprehensive safety and health program. The eTools are posted at www.osha.gov, and are based on guidelines that identify four general elements critical to a successful safety and health management system:

- ? Management leadership and employee involvement,
- ? Worksite analysis,
- ? Hazard prevention and control, and
- ? Safety and health training.

What are state programs?

The *Occupational Safety and Health Act of 1970 (OSH Act)* encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans and funds up to 50 percent of each program's operating costs. State plans must provide standards and enforcement programs, as well as voluntary compliance activities, that are at least as effective as Federal OSHA's.

Currently, 26 states and territories have their own plans. Twenty-three cover both private and public (state and local government) employees and three states, Connecticut, New Jersey, and New York, cover only the public sector. For more information on state plans, see the list at the end of this publication, or visit OSHA's website at www.osha.gov.

What is consultation assistance?

Consultation assistance is available on request to employers who want help establishing and maintaining a safe and healthful workplace. Funded largely by OSHA, the service is provided at no cost to small employers and is delivered by state authorities through professional safety and health consultants.

What is the Safety and Health Achievement Recognition Program (SHARP)?

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards, and developing an effective safety and health program management program.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for 1 year initially, or 2 years upon renewal. For more information about consultation assistance, see the list of consultation projects at the end of this publication.

What are the Voluntary Protection Programs (VPPs)?

Voluntary Protection Programs are designed to recognize outstanding achievements by companies that have developed and implemented effective safety and health management programs. There are three levels of VPPs: Star, Merit, and Demonstration. All are designed to achieve the following goals:

- ? Recognize employers that have successfully developed and implemented effective and comprehensive safety and health management programs;
- ? Encourage these employers to continuously improve their safety and health management programs;
- ? Motivate other employers to achieve excellent safety and health results in the same outstanding way; and
- ? Establish a cooperative relationship between employers, employees, and OSHA.

VPP participation can bring many benefits to employers and employees, including fewer worker fatalities, injuries, and illnesses; lost-workday case rates generally 50 percent below industry averages; and lower workers' compensation and other injury- and illness-related costs. In addition, many VPP sites report improved employee motivation to work safely, leading to a better quality of life at work; positive community recognition and interaction; further improvement and revitalization of already-good safety and health programs; and a positive relationship with OSHA.

After a site applies for the program, OSHA reviews an employer's VPP application and conducts a VPP onsite evaluation to verify that the site's safety and health management programs are operating effectively. OSHA conducts onsite evaluations on a regular basis, annually for participants at the demonstration level, every 18 months for Merit, and every 3 to 5 years for Star. Once a year, all participants must send a copy of their most recent annual internal evaluation to their OSHA regional office. This evaluation must include the worksite's record of injuries and illnesses for the past year.

Sites participating in VPP are not scheduled for regular, programmed inspections. OSHA does, however, handle any employee complaints, serious accidents, or significant chemical releases that may occur at VPP sites according to routine enforcement procedures.

Additional information on VPP is available from OSHA national, regional, and area offices listed at the end of this booklet. Also, see "Cooperative Programs" on OSHA's website.

How can a partnership with OSHA improve worker safety and health?

OSHA has learned firsthand that voluntary, cooperative partnerships with employers, employees, and unions can be a useful alternative to traditional enforcement and an effective way to reduce worker deaths, injuries, and illnesses. This is especially true when a partnership leads to the development and implementation of a comprehensive workplace safety and health management program.

What is OSHA's Strategic Partnership Program (OSPP)?

OSHA Strategic Partnerships are agreements among labor, management, and government to improve workplace safety and health. These partnerships encourage, assist, and recognize the efforts of the partners to eliminate serious workplace hazards and achieve a high level of worker safety and health. Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships build cooperative relationships with groups of employers and employees.

There are two major types of OSPPs. Comprehensive partnerships focus on establishing comprehensive safety and health management systems at partnering worksites. Limited partnerships help identify and eliminate hazards associated with worker deaths, injuries, and illnesses, or have goals other than establishing comprehensive worksite safety and health programs.

For more information about this program, contact your nearest OSHA office or visit the agency's website.

What occupational safety and health training does OSHA offer?

The OSHA Training Institute in Arlington Heights, IL, provides basic and advanced training and education in safety and health for federal and state compliance officers, state consultants, other federal agency personnel, and private-sector employers, employees, and their representatives.

What is the OSHA Training Grant Program?

OSHA awards grants to nonprofit organizations to provide safety and health training and education to employers and workers in the workplace. Grants often focus on high risk activities or hazards or may help nonprofit organizations in training, education, and outreach.

OSHA expects each grantee to develop a program that addresses a safety and health topic named by OSHA, recruit workers and employers for the training, and conduct the training. Grantees are also expected to follow up with students to find out how they applied the training in their workplaces.

For more information contact OSHA Office of Training and Education, 2020 Arlington Heights Road, Arlington Heights, IL 60005; or call (847) 297-4810.

What other assistance materials does OSHA have available?

OSHA has a variety of materials and tools on its website at www.osha.gov. These include eTools such as Expert Advisors and Electronic Compliance Assistance Tools, information on specific health and safety topics, regulations, directives, publications, videos, and other information for employers and employees.

OSHA also has an extensive publications program. For a list of free or sales items, visit OSHA's website at www.osha.gov or contact the OSHA Publications Office,

U.S. Department of Labor, 200 Constitution Avenue, NW, N-3101, Washington, DC 20210. Telephone (202) 693-1888 or fax to (202) 693-2498.

In addition, OSHA's CD-ROM includes standards, interpretations, directives, and more. It is available for sale from the U.S. Government Printing Office. To order, write to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, or phone (202) 512-1800.

What do I do in case of an emergency or to file a complaint?

To report an emergency, file a complaint, or seek OSHA advice, assistance, or products, call (800) 321-OSHA or contact your nearest OSHA regional, area, state plan, or consultation office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889-5627.

Employees can also file a complaint online and get more information on OSHA federal and state programs by visiting OSHA's website at www.osha.gov.

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910 and 1926

[Docket No. H-049]

RIN 1218-AA05

Respiratory Protection

AGENCY: Occupational Safety and Health Administration (OSHA), Department of Labor.

ACTION: Final rule; Request for comment on paperwork requirements.

SUMMARY: This final standard, which replaces the respiratory protection standards adopted by OSHA in 1971 (29 CFR 1910.134 and 29 CFR 1926.103), applies to general industry, construction, shipyard,

longshoring, and marine terminal workplaces. The standard requires employers to establish or maintain a respiratory protection program to protect their respirator-wearing employees. The standard contains requirements for program administration; worksite-specific procedures; respirator selection; employee training; fit testing; medical evaluation; respirator use; respirator cleaning, maintenance, and repair; and other provisions. The final standard also simplifies respirator requirements for employers by deleting respiratory provisions in other OSHA health standards that duplicate those in the final standard and revising other respirator-related provisions to make them consistent. In addition, the standard addresses the use of respirators in Immediately Dangerous to Life or Health (IDLH) atmospheres, including interior structural firefighting. During interior structural firefighting (an IDLH atmosphere by definition), self-contained breathing apparatus is required, and two firefighters must be on standby to provide assistance or perform rescue when two firefighters are inside the burning building.

Based on the record in this rulemaking and the Agency's own experience in enforcing its prior respiratory protection standards, OSHA has concluded that compliance with the final rule will assist employers in protecting the health of employees exposed in the course of their work to airborne contaminants, physical hazards, and biological agents, and that the standard is therefore necessary and appropriate. The final respiratory protection standard covers an estimated 5 million respirator wearers working in an estimated 1.3 million workplaces in the covered sectors. OSHA's benefits analysis predicts that the standard will prevent many deaths and illnesses among respirator-wearing employees every year by protecting them from exposure to acute and chronic health hazards. OSHA estimates that compliance with this standard will avert hundreds of deaths and thousands of illnesses annually. The annual costs of the standard are estimated to be \$111 million, or an average of \$22 per covered employee per year.

DATES: The final rule becomes effective April 8, 1998.

Compliance: Start-up dates for specific provisions are set forth in Sec. 1910.134(n) of the regulatory text. However, until the Department of Labor publishes in the **Federal Register** the control numbers assigned by the Office of Management and Budget (OMB), affected parties are not required to comply with the new or revised information collection requirements contained in the following paragraphs: Sec. 1910.134(c) written procedures for selecting respirators, medical evaluations, fit testing, use of respirators, maintaining respirators, training, and periodically evaluating the effectiveness of the program; (e)(3) - (6) medical questionnaire, examination, and information for the physician or other licensed health care professional (PLHCP); (f)(1) fit testing; (i)(4) tagging sorbent beds and filters; and (m)(1) - (2) and (4) recordkeeping. Publication of the control numbers notifies the public that the OMB has approved these information collection requirements under the Paperwork Reduction Act of 1995. Although affected parties will not have to comply with the revised standard's information collection requirements until these have been approved by OMB, they must comply with those requirements of 29 CFR 1910.134 (OSHA's existing respirator protection standard) that have already been approved by the OMB under the Paperwork Reduction Act. Approved requirements include the written program, emergency-use respirator certification records, and emergency-use respirator compartment marking.

Comments: Interested parties may submit comments on the information collection requirements for this standard until March 9, 1998.

ADDRESSES: In compliance with 28 U.S.C. 2112(a), the Agency designates the Associate Solicitor for Occupational Safety and Health, Office of the Solicitor, Room S-4004, U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, as the recipient of petitions for review of the standard.

Comments on the information collection requirements of this final rule (see **SUPPLEMENTARY INFORMATION**) are to be submitted to the Docket Office, Docket No. ICR 97-5, U.S. Department of Labor, Room N-2625, 200 Constitution Avenue, N.W., Washington, D.C. 20210, telephone (202) 219-7894. Written comments limited to 10 pages or less in length may also be transmitted by facsimile to (202) 219-5046.

Copies of the referenced information collection request are available for inspection and copying in the Docket Office and will be mailed immediately to persons who request copies by telephoning Adrian Corsey at (202) 219-7075. For electronic copies of the Respiratory Protection Final Standard and the Information Collection Request, contact OSHA's WebPage on the Internet at <http://www.osha.gov/>.

FOR FURTHER INFORMATION CONTACT: Bonnie Friedman, Director, OSHA Office of Public Affairs, Room N-3647, U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210; Telephone (202) 219-8148. For additional copies of this regulation contact: OSHA, Office of Publications,

U.S. Department of Labor, Room N-3101, 200 Constitution Avenue, N.W., Washington, D.C. 20210; Telephone (202) 219-4667.

SUPPLEMENTARY INFORMATION:

1. Collection of Information: Request for Comment

This final Respiratory Protection standard contains information collection requirements that are subject to review by OMB under the Paperwork Reduction Act of 1995 (PRA95), 44 U.S.C. 3501 *et seq.* (see also 5 CFR 1320). PRA95 defines collection of information to mean, "the obtaining, causing to be obtained, soliciting, or requiring the disclosure to third parties or the public of facts or opinions by or for an agency regardless of form or format." [44 U.S.C. Sec. 3502(3)(A)]

The title, the need for and proposed use of the information, a summary of the collections of information, description of the respondents, and frequency of response required to implement the required information collection are described below with an estimate of the annual cost and reporting burden (as required by 5 CFR 1320.5 (a)(1)(iv) and Sec. 1320.8 (d)(2)). Included in the estimate is the time for reviewing instructions, gathering and maintaining the data needed, and completing and reviewing the collection of information.

OSHA invites comments on whether the proposed collection of information:

- ? Ensures that the collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;
- ? Estimates the projected burden accurately, including whether the methodology and assumptions used are valid;
- ? Enhances the quality, utility, and clarity of the information to be collected; and
- ? Minimizes the burden of the collection of information on those who are to respond, including the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g., permitting electronic submissions of responses.

Title: Respiratory Protection, 29 CFR 1910.134.

Description: The final Respiratory Protection standard is an occupational health standard that will minimize occupational exposure to toxic substances. The standard's information collection requirements are essential components that will protect employees from occupational exposure to these toxins. The information will be used by employers and employees to implement the protection required by the standard. OSHA will use some of the information to determine compliance with the standard.

Respondents: The total number of respondents for the first year is 1,300,000, and for the second year 1,430,000 (1,300,000 (1st year) plus 10% (130,000)).

Average Time Per Response: 2.21 hours (this is the result of dividing the total number of responses (19,767,461) by the total number of burden hours (8,926,558)).

Average Time Per Firm: 6.87 hours (this represents the average time a firm would need to comply with all of the information collection provisions, including the written respiratory protection program. This is a result of dividing the total number of burden hours (8,926,558) by the total number of firms (1,300,000)).

MARGINAL DIFFERENCES IN BURDEN HOURS AND COSTS (I.E., BETWEEN THE EXISTING AND REVISED STANDARDS)

Information collection requirement	Current OMB inventory existing 1910.134	Adjustment (to 1st year only)	1st yr. burden revised 1910.134	Estimated cost	2nd & recurring yr. burden revised 1910.134	Estimated cost
Respiratory Protection Program	395,489	2,256,511	2,652,000	\$60,916,440	1,570,400	\$36,072,088
Questionnaire Administration	-	740,000	740,000	\$13,593,800	85,100	\$1,563,287
Medical Examinations	-	1,021,200	1,021,200	\$18,759,444	255,300	\$4,689,861
Information Provided to PLHCP	-	170,200	170,200	\$2,358,972	42,550	\$589,743
Fit Testing	-	3,780,140	3,780,140	\$76,813,315	3,780,140	\$76,813,315
Emergency-Use Respirator Marking	433	-433	0	\$0	448	\$8,230
Emergency-Use Respirator Certification ..	785,842	-671,622	114,220	\$2,098,221	11,424	\$209,859
Certificate of Analysis of Cylinders	-	0	0	\$0	0	\$0
Sorbent Beds and Filters	-	5,934	5,934	\$109,008	5,934	\$109,008
Medical Records	-	54,464	54,464	\$754,871	13,616	\$188,718
Fit Testing Records	-	348,400	348,400	\$4,828,824	348,400	\$4,828,824
Employee Access	-	40,000	40,000	\$554,400	40,000	\$554,400
Hour Kept in Inventory for Revised 1910.134	1	-1	0	\$0	0	\$0
Totals	1,181,765	7,744,793	8,926,558	\$180,787,295	6,153,312	\$125,627,333

Under the column for "Current OMB Inventory," dashes denote burdens that were not taken for the Existing Respiratory Protection Standard, but are counted in the Revised Respiratory Protection Standard. Both Medical Examinations and Fit Testing are required by the existing standard; however, because these requirements are not accompanied by a recordkeeping requirement, no burden was taken. In the revised standard, recordkeeping is required for these provisions, and thus burden is counted for these provisions.

Interested parties are requested to send comments regarding this information collection to the OSHA Docket Office, Docket No. ICR 97-5, U.S. Department of Labor, Room N-2625, 200 Constitution Avenue, N.W., Washington, D.C. 20210. Written comments limited to 10 pages or fewer may also be transmitted by facsimile to (202) 219-5046.

Comments submitted in response to this notice will be summarized and included in the request for Office of Management and Budget approval of the final information collection request; they will also become a matter of public record.

Copies of the referenced information collection request are available for inspection and copying in the OSHA Docket Office and will be mailed to persons who request copies by telephoning Adrian Corsey at (202) 219-7075. Electronic copies of the Respiratory Protection Final information collection request are available on the OSHA WebPage on the internet at <http://www.osha.gov/> under Standards.

2. Federalism

This final standard has been reviewed in accordance with Executive Order 12612 (52 FR 41685, October 30, 1987), regarding Federalism. This Order requires that agencies, to the extent possible, refrain from limiting state policy options, consult with states prior to taking any actions which would restrict state policy options, and take such actions only when there is clear constitutional authority and the presence of a problem of national scope. The Order provides for preemption of state law only if there is a clear Congressional intent for the Agency to do so. Any such preemption is to be limited to the extent possible.

Section 18 of the Occupational Safety and Health Act (OSH Act) expresses Congress' clear intent to preempt state laws relating to issues on which Federal OSHA has promulgated occupational safety and health standards. Under the OSH Act, a state can avoid preemption only if it submits, and obtains Federal approval of, a plan for the development of such standards and their enforcement. Occupational safety and health standards developed by such Plan-States must, among other things, be at least as effective in providing safe and healthful employment and places of employment as the Federal standards. Where such standards are applicable to products distributed or used in interstate commerce, they may not unduly burden commerce and must be justified by compelling local conditions (see OSH Act, Section 18(c)).

The final Federal standard on respiratory protection addresses hazards which are not unique to any one state or region of the country. Nonetheless, states with occupational safety and health plans approved under Section 18 of the OSH Act will be able to develop their own state standards to deal with any special problems which might be encountered in a particular state. Moreover, because this standard is written in general, performance-oriented terms, there is considerable flexibility for state plans to require, and for affected employers to use, methods of compliance which are appropriate to the working conditions covered by the standard.

In brief, this final standard addresses a clear national problem related to occupational safety and health in general industry, construction, and maritime employment. Those states which have elected to participate under Section 18 of the OSH Act are not preempted by this standard, and will be able to address any special conditions within the framework of the Federal Act while ensuring that the state standards are at least as effective as that standard.

3. State Plans

The 25 states and territories with their own OSHA-approved occupational safety and health plans must adopt a comparable standard within six months of the publication date of a final standard. These 25 states are: Alaska, Arizona, California, Connecticut, New York (for state and local government employees only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming. Until such time as a state standard is promulgated, Federal OSHA will provide interim enforcement assistance, as appropriate, in these states.

4. Unfunded Mandates

The final respiratory protection rule has been reviewed in accordance with the Unfunded Mandates Reform Act of 1995 (UMRA) (2 U.S.C. 1501 et seq.) and Executive Order 12875. As discussed below in the Summary of the Final Economic Analysis (FEA) (Section VI of this document), OSHA estimates that compliance with the revised respiratory protection standard will require the expenditure of more than \$100 million each year by employers in the private sector. Therefore, the final rule establishes a Federal private sector mandate and is a significant regulatory action, within the meaning of section 202 of UMRA (2 U.S.C. 1532). OSHA has included this statement to address the anticipated effects of the final respiratory protection rule pursuant to section 202.

OSHA standards do not apply to state and local governments, except in states that have voluntarily elected to adopt an OSHA State Plan. Consequently, the respiratory protection standard does not meet the definition of a "Federal intergovernmental mandate" (Section 421(5) of UMRA (2 U.S.C. 658(5)). Thus, the final respiratory protection standard does not impose unfunded mandates on state or local governments.

The anticipated benefits and costs of this final standard, and other issues raised in section 202 of the UMRA, are addressed in the Summary of the FEA (Section VI of this preamble), below, and in the FEA (Ex. 196). In addition, pursuant to section 205 of the UMRA (2 U.S.C. 1535), having considered a reasonable number of alternatives as outlined in the preambles to the proposal and the final rule and in the FEA (Ex. 196), the Agency has concluded that the final rule is the most cost-effective alternative for implementation of OSHA's statutory objective of reducing significant risk to the extent feasible. This is discussed in the FEA (Ex. 196) and in the Summary and Explanation (Section VII of this preamble) for the various provisions of the final standard.

5. Executive Order 13045 -- Protection of Children From Environmental Health and Safety Risks

Executive Order 13045, signed by the President on April 21, 1997, requires that for certain Federal agency "regulatory actions submitted to OMB's Office of Information and Regulatory Affairs (OIRA) for review pursuant to Executive Order 12866, the issuing agency shall provide to OIRA the following information developed as part of the Agency's decisionmaking process, unless prohibited by law:

- (a) An evaluation of the environmental health or safety effects of the planned regulation on children; and
- (b) An explanation of why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the agency."

"Covered Regulatory Actions" under this Order are rules that may:

- (a) Be "economically significant" under Executive Order 12866 (a rulemaking that has an annual effect on the economy of \$100 million or more or would adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities); and
- (b) Concern an environmental health risk or safety risk that an agency has reason to believe may disproportionately affect children.

"Environmental health risks and safety risks" mean risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to).

The final standard on respiratory protection does not concern "Environmental health risks and safety risks" to children as defined under the Executive order. The respirator standard is only concerned with means of limiting employee exposures to toxic substances. The Agency believes, therefore, that the requirement noted

above to provide OIRA with certain information does not apply since the respiratory protection standard is not a "covered regulatory action" under Executive Order 13045.

Section 6(b) (8) of the OSH Act requires OSHA to explain "why a rule promulgated by the Secretary differs substantially from an existing national consensus standard," by publishing "a statement of the reasons why the rule as adopted will better effectuate the purposes of the Act than the national consensus standard." In compliance with the requirement, the Agency has reviewed the standards proposed through this rulemaking with reference to the ANSI Z88.2-1992 standard for Respiratory Protection. OSHA has discussed the relationship between individual regulatory provisions and the corresponding consensus standards in the Summary and Explanation of the final rule.

6. Reasons Why the Revised Rule Will Better Effectuate the Purposes of the Act Than the Existing Consensus Standard

This process was facilitated by the fact that the previous OSHA standards on respiratory protection were start-up standards adopted directly from the ANSI Z88.2-1969 standard, "Practices for Respiratory Protection" under section 6(a) of the OSH Act, 29 U.S.C. 655(a). Therefore, even with subsequent revisions to the ANSI standards and the Agency's consideration of a widely varied and substantial body of information in the rulemaking record, the requirements of the OSHA final rule would tend to resemble the corresponding provisions of the current ANSI standards. In a number of instances, OSHA has utilized language identical to that in the current ANSI standard. These instances are noted in the Summary and Explanation. Where the Agency has determined that the pertinent ANSI language is not appropriate for this OSHA standard, the Summary and Explanation provides the basis for that decision.

[63 FR 1152, January 8, 1998]

HAND and POWER TOOLS

U.S. Department of Labor
Elaine L. Chao, Secretary

Occupational Safety and Health Administration
John L. Henshaw, Assistant Secretary

OSHA 3080
2002 (Revised)

This informational booklet is intended to provide a generic, non-exhaustive overview of a particular standards-related topic. This publication does not itself alter or determine compliance responsibilities, which are set forth in OSHA standards themselves and the *Occupational Safety and Health Act*. Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements, the reader should consult current and administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the courts.

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Contents

What Is the Purpose of This Booklet?

This booklet is designed to present to employees and employers a summary of the basic safety procedures and safeguards associated with hand and portable power tools.

Material in this booklet is based on the standards of the Occupational Safety and Health Administration; this booklet, however, should not be considered as a substitute for the full safety and health standards for general industry (published in Title 29 *Code of Federal Regulations* (CFR), Part 1910, Subpart P), or for the construction industry (published in 29 CFR Part 1926, Subpart I). These are also available on the World Wide Web at www.osha.gov.

Employers and employees in the 26 states and territories with OSHA-approved state safety and health plans should check with their state agency. Their state may be enforcing standards and other procedures that, while "at least as effective as" federal standards, are not always identical to the federal requirements. (See page 13 for more information on state plans.)

Tools are such a common part of our lives that it is difficult to remember that they may pose hazards. Tragically, a serious incident can occur before steps are taken to identify and avoid or eliminate tool-related hazards.

Employees who use hand and power tools and are exposed to the hazards of falling, flying, abrasive, and splashing objects, or to harmful dusts, fumes, mists, vapors, or gases must be provided with the appropriate personal protective equipment. All electrical connections for these tools must be suitable for the type of tool and the working conditions (wet, dusty, flammable vapors). When a temporary power source is used for construction a ground-fault circuit interrupter should be used.

Employees should be trained in the proper use of all tools. Workers should be able to recognize the hazards associated with the different types of tools and the safety precautions necessary.

Five basic safety rules can help prevent hazards associated with the use of hand and power tools:

- ? Keep all tools in good condition with regular maintenance.
- ? Use the right tool for the job.
- ? Examine each tool for damage before use and do not use damaged tools.
- ? Operate tools according to the manufacturers' instructions.
- ? Provide and use properly the right personal protective equipment.

Employees and employers should work together to establish safe working procedures. If a hazardous situation is encountered, it should be brought immediately to the attention of the proper individual for hazard abatement.

The following sections identify various types of hand and power tools and their potential hazards. They also identify ways to prevent worker injury through proper use of the tools and through the use of appropriate personal protective equipment.

What Are the Hazards of Hand Tools?

Hand tools are tools that are powered manually. Hand tools include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.

Some examples include the following:

- ? If a chisel is used as a screwdriver, the tip of the chisel may break and fly off, hitting the user or other employees.
- ? If a wooden handle on a tool, such as a hammer or an axe, is loose, splintered, or cracked, the head of the tool may fly off and strike the user or other employees.
- ? If the jaws of a wrench are sprung, the wrench might slip.
- ? If impact tools such as chisels, wedges, or drift pins have mushroomed heads, the heads might shatter on impact, sending sharp fragments flying toward the user or other employees.

The employer is responsible for the safe condition of tools and equipment used by employees. Employers shall not issue or permit the use of unsafe hand tools. Employees should be trained in the proper use and handling of tools and equipment.

Employees, when using saw blades, knives, or other tools, should direct the tools away from aisle areas and away from other employees working in close proximity. Knives and scissors must be sharp; dull tools can cause more hazards than sharp ones. Cracked saw blades must be removed from service.

Wrenches must not be used when jaws are sprung to the point that slippage occurs. Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads. The wooden handles of tools must not be splintered.

Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials should be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used.

What Are the Dangers of Power Tools?

Appropriate personal protective equipment such as safety goggles and gloves must be worn to protect against hazards that may be encountered while using hand tools.

Workplace floors shall be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools.

Power tools must be fitted with guards and safety switches; they are extremely hazardous when used improperly. The types of power tools are determined by their power source: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated.

To prevent hazards associated with the use of power tools, workers should observe the following general precautions:

- ? Never carry a tool by the cord or hose.
- ? Never yank the cord or the hose to disconnect it from the receptacle.
- ? Keep cords and hoses away from heat, oil, and sharp edges.
- ? Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.
- ? Keep all people not involved with the work at a safe distance from the work area.
- ? Secure work with clamps or a vise, freeing both hands to operate the tool.
- ? Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.
- ? Maintain tools with care; keep them sharp and clean for best performance.
- ? Follow instructions in the user's manual for lubricating and changing accessories.
- ? Be sure to keep good footing and maintain good balance when operating power tools.
- ? Wear proper apparel for the task. Loose clothing, ties, or jewelry can become caught in moving parts.

- ? Remove all damaged portable electric tools from use and tag them: "Do Not Use."

Guards

The exposed moving parts of power tools need to be safeguarded. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded.

Machine guards, as appropriate, must be provided to protect the operator and others from the following:

- ? Point of operation.
- ? In-running nip points.
- ? Rotating parts.
- ? Flying chips and sparks.

Safety guards must never be removed when a tool is being used. Portable circular saws having a blade greater than 2 inches (5.08 centimeters) in diameter must be equipped at all times with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work material.

Operating Controls and Switches

The following hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released: drills; tappers; fastener drivers; horizontal, vertical, and angle grinders with wheels more than 2 inches (5.08 centimeters) in diameter; disc sanders with discs greater than 2 inches (5.08 centimeters); belt sanders; reciprocating saws; saber saws, scroll saws, and jigsaws with blade shanks greater than 1/4-inch (0.63 centimeters) wide; and other similar tools. These tools also may be equipped with a "lock-on" control, if it allows the worker to also shut off the control in a single motion using the same finger or fingers. The following hand-held power tools must be equipped with either a positive "on-off" control switch, a constant pressure switch, or a "lock-on" control: disc sanders with discs 2 inches (5.08 centimeters) or less in diameter; grinders with wheels 2 inches (5.08 centimeters) or less in diameter; platen sanders, routers, planers, laminate trimmers, nibblers, shears, and scroll saws; and jigsaws, saber and scroll saws with blade shanks a nominal 1/4-inch (6.35 millimeters) or less in diameter. It is recommended that the constant-pressure control switch be regarded as the preferred device.

Other hand-held power tools such as circular saws having a blade diameter greater than 2 inches (5.08 centimeters), chain saws, and percussion tools with no means of holding accessories securely must be equipped with a constant-pressure switch.

Electric Tools

Employees using electric tools must be aware of several dangers. Among the most serious hazards are electrical burns and shocks.

Electrical shocks, which can lead to injuries such as heart failure and burns, are among the major hazards associated with electric-powered tools. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death. An electric shock also can cause the user to fall off a ladder or other elevated work surface and be injured due to the fall.

To protect the user from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low-voltage isolation transformer. Three-wire cords contain two current-carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong must never be removed from the plug.

Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On double-insulated tools, an internal layer of protective insulation completely isolates the

external housing of the tool.

The following general practices should be followed when using electric tools:

- ? Operate electric tools within their design limitations.
- ? Use gloves and appropriate safety footwear when using electric tools.
- ? Store electric tools in a dry place when not in use.
- ? Do not use electric tools in damp or wet locations unless they are approved for that purpose.
- ? Keep work areas well lighted when operating electric tools.
- ? Ensure that cords from electric tools do not present a tripping hazard.

In the construction industry, employees who use electric tools must be protected by ground-fault circuit interrupters or an assured equipment-grounding conductor program.

Portable Abrasive Wheel Tools

Portable abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments. Abrasive wheel tools must be equipped with guards that: (1) cover the spindle end, nut, and flange projections; (2) maintain proper alignment with the wheel; and (3) do not exceed the strength of the fastenings.

Before an abrasive wheel is mounted, it must be inspected closely for damage and should be sound- or ring-tested to ensure that it is free from cracks or defects. To test, wheels should be tapped gently with a light, non-metallic instrument. If the wheels sound cracked or dead, they must not be used because they could fly apart in operation. A stable and undamaged wheel, when tapped, will give a clear metallic tone or "ring."

To prevent an abrasive wheel from cracking, it must fit freely on the spindle. The spindle nut must be tightened enough to hold the wheel in place without distorting the flange. Always follow the manufacturer's recommendations. Take care to ensure that the spindle speed of the machine will not exceed the maximum operating speed marked on the wheel.

An abrasive wheel may disintegrate or explode during start-up. Allow the tool to come up to operating speed prior to grinding or cutting. The employee should never stand in the plane of rotation of the wheel as it accelerates to full operating speed. Portable grinding tools need to be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of wheel breakage.

When using a powered grinder:

- ? Always use eye or face protection.
- ? Turn off the power when not in use.
- ? Never clamp a hand-held grinder in a vise.

Pneumatic Tools

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders.

There are several dangers associated with the use of pneumatic tools. First and foremost is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected. A short wire or positive locking device attaching the air hose to the tool must also be used and will serve as an added safeguard.

If an air hose is more than 1/2-inch (12.7 millimeters) in diameter, a safety excess flow valve must be installed at the source of the air supply to reduce pressure in case of hose failure.

In general, the same precautions should be taken with an air hose that are recommended for electric cords,

because the hose is subject to the same kind of damage or accidental striking, and because it also presents tripping hazards.

When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation.

Pneumatic tools that shoot nails, rivets, staples, or similar fasteners and operate at pressures more than 100 pounds per square inch (6,890 kPa), must be equipped with a special device to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.

Airless spray guns that atomize paints and fluids at pressures of 1,000 pounds or more per square inch (6,890 kPa) must be equipped with automatic or visible manual safety devices that will prevent pulling the trigger until the safety device is manually released.

Eye protection is required, and head and face protection is recommended for employees working with pneumatic tools.

Screens must also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.

Compressed air guns should never be pointed toward anyone. Workers should never "dead-end" them against themselves or anyone else. A chip guard must be used when compressed air is used for cleaning.

Use of heavy jackhammers can cause fatigue and strains. Heavy rubber grips reduce these effects by providing a secure handhold. Workers operating a jackhammer must wear safety glasses and safety shoes that protect them against injury if the jackhammer slips or falls. A face shield also should be used.

Noise is another hazard associated with pneumatic tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

Liquid Fuel Tools

Fuel-powered tools are usually operated with gasoline. The most serious hazard associated with the use of fuel-powered tools comes from fuel vapors that can burn or explode and also give off dangerous exhaust fumes. The worker must be careful to handle, transport, and store gas or fuel only in approved flammable liquid containers, according to proper procedures for flammable liquids.

Before refilling a fuel-powered tool tank, the user must shut down the engine and allow it to cool to prevent accidental ignition of hazardous vapors. When a fuel-powered tool is used inside a closed area, effective ventilation and/or proper respirators such as atmosphere-supplying respirators must be utilized to avoid breathing carbon monoxide. Fire extinguishers must also be available in the area.

Powder-Actuated Tools

Powder-actuated tools operate like a loaded gun and must be treated with extreme caution. In fact, they are so dangerous that they must be operated only by specially trained employees.

When using powder-actuated tools, an employee must wear suitable ear, eye, and face protection. The user must select a powder level -- high or low velocity -- that is appropriate for the powder-actuated tool and necessary to do the work without excessive force.

The muzzle end of the tool must have a protective shield or guard centered perpendicular to and concentric with the barrel to confine any fragments or particles that are projected when the tool is fired. A tool containing a high-velocity load must be designed not to fire unless it has this kind of safety device.

To prevent the tool from firing accidentally, two separate motions are required for firing. The first motion is to bring the tool into the firing position, and the second motion is to pull the trigger. The tool must not be

able to operate until it is pressed against the work surface with a force of at least 5 pounds (2.2 kg) greater than the total weight of the tool.

If a powder-actuated tool misfires, the user must hold the tool in the operating position for at least 30 seconds before trying to fire it again. If it still will not fire, the user must hold the tool in the operating position for another 30 seconds and then carefully remove the load in accordance with the manufacturer's instructions. This procedure will make the faulty cartridge less likely to explode. The bad cartridge should then be put in water immediately after removal. If the tool develops a defect during use, it should be *tagged* and must be *taken out of service immediately* until it is properly repaired.

Safety precautions that must be followed when using powder-actuated tools include the following:

- ? Do not use a tool in an explosive or flammable atmosphere.
- ? Inspect the tool before using it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions and has the proper shield, guard, and attachments recommended by the manufacturer.
- ? Do not load the tool unless it is to be used immediately.
- ? Do not leave a loaded tool unattended, especially where it would be available to unauthorized persons.
- ? Keep hands clear of the barrel end.
- ? Never point the tool at anyone.

When using powder-actuated tools to apply fasteners, several additional procedures must be followed:

- ? Do not fire fasteners into material that would allow the fasteners to pass through to the other side.
- ? Do not drive fasteners into very hard or brittle material that might chip or splatter or make the fasteners ricochet.
- ? Always use an alignment guide when shooting fasteners into existing holes.
- ? When using a high-velocity tool, do not drive fasteners more than 3 inches (7.62 centimeters) from an unsupported edge or corner of material such as brick or concrete.
- ? When using a high velocity tool, do not place fasteners in steel any closer than 1/2-inch (1.27 centimeters) from an unsupported corner edge unless a special guard, fixture, or jig is used.

Hydraulic Power Tools

The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.

The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.

All jacks -- including lever and ratchet jacks, screw jacks, and hydraulic jacks -- must have a stop indicator, and the stop limit must not be exceeded. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded.

A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. Put a block under the base of the jack when the foundation is not firm, and place a block between the jack cap and load if the cap might slip.

To set up a jack, make certain of the following:

- ? The base of the jack rests on a firm, level surface;
- ? The jack is correctly centered;

- ? The jack head bears against a level surface; and
- ? The lift force is applied evenly.

Proper maintenance of jacks is essential for safety. All jacks must be lubricated regularly. In addition, each jack must be inspected according to the following schedule: (1) for jacks used continuously or intermittently at one site -- inspected at least once every 6 months, (2) for jacks sent out of the shop for special work -- inspected when sent out and inspected when returned, and (3) for jacks subjected to abnormal loads or shock -- inspected before use and immediately thereafter.

What Help Can OSHA Provide?

OSHA can provide extensive help through a variety of programs, including assistance about safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, training and education, and more.

Safety and Health Program Management Guidelines

Working in a safe and healthful environment can stimulate innovation and creativity and result in increased performance and higher productivity.

To assist employers and employees in developing effective safety and health management systems, OSHA published recommended *Safety and Health Program Management Guidelines* (*Federal Register* 54(16): 3904-3916, January 26, 1989). These voluntary guidelines can be applied to all places of employment covered by OSHA.

The guidelines identify four general elements that are critical to the development of a successful safety and health management system. These are the following:

- ? Management leadership and employee involvement,
- ? Worksite analysis,
- ? Hazard prevention and control, and
- ? Safety and health training. The guidelines recommend specific actions, under each of these general elements, to achieve an effective safety and health management system. The *Federal Register* notice is available online at www.osha.gov.

State Programs

The *Occupational Safety and Health Act of 1970 (OSH Act)* encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans. There are currently 26 state plans: 23 cover both private and public (state and local government) employment; 3 states, Connecticut, New Jersey, and New York, cover the public sector only. States and territories with their own OSHA-approved occupational safety and health plans must adopt and enforce standards identical to, or at least as effective as, the federal standards and provide extensive programs of voluntary compliance and technical assistance, including consultation services.

Consultation Services

Consultation assistance is available on request to employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. Primarily developed for smaller employers with more hazardous operations, the consultation service is delivered by state governments employing professional safety and health consultants. Comprehensive assistance includes a hazard survey of the worksite and appraisal of all aspects of the employer's existing safety and health management system. In addition, the service offers assistance to employers in developing and implementing an effective safety and health management system. No penalties are proposed or citations issued for hazards identified by the consultant. The employer's only obligation is to correct all identified serious hazards within the agreed upon correction timeframe. OSHA provides consultation assistance to the

employer with the assurance that his or her name and firm and any information about the workplace will not be routinely reported to OSHA enforcement staff.

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation in SHARP includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards, and developing an effective safety and health program management system.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for a period of 1 year initially, or 2 years upon renewal. For more information concerning consultation assistance, see the list of consultation projects listed at the end of this publication.

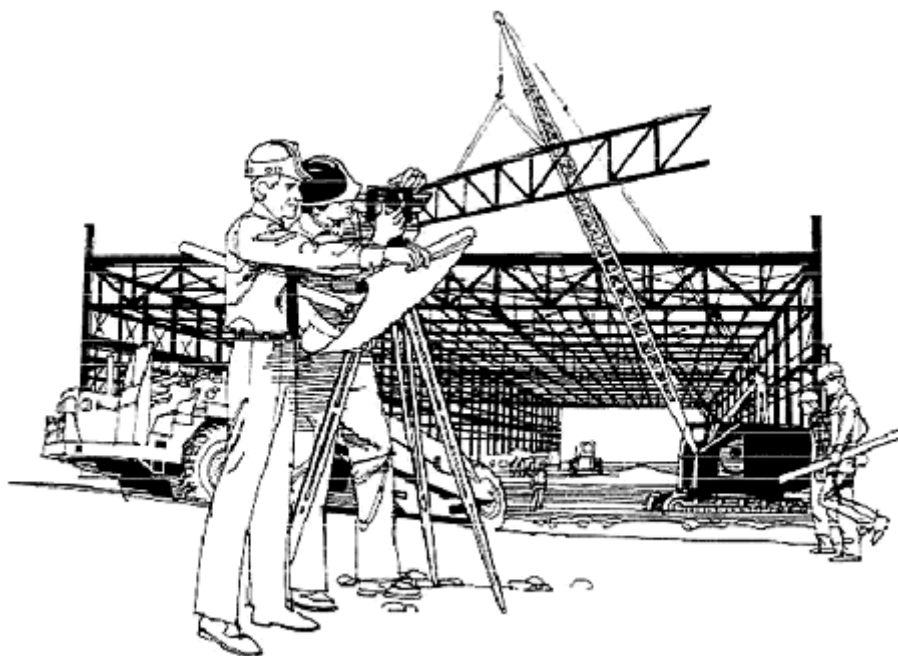
Voluntary Protection Programs (VPP)

Voluntary Protection Programs and onsite consultation services, when coupled with an effective enforcement program, expand worker protection to help meet the goals of the *OSH Act*. The three levels of VPP -- Star, Merit, and Demonstration -- are designed to recognize outstanding achievements by companies that have developed and implemented effective safety and health management systems. The VPPs motivate others to achieve excellent safety and health results in the same outstanding way as they establish a cooperative relationship between employers, employees, and OSHA.

For additional information on VPPs and how to apply, contact the OSHA regional offices listed at the end of this publication.

The 100 Most Frequently Cited OSHA Construction Standards: A Guide for the Abatement of the Top 25 Physical Hazards

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



PUBLICATION DISCLAIMER
OSHA's 100 Most Frequently Cited Standards:

The information contained in this document was correct at the time of publication in 1991. Several standards have changed since that time. The current standards may be viewed by selecting this hyperlink: http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1926

There have been technological advances in safety equipment, and some of the acceptable abatement methods indicated are no longer the safest means to protect the worker. The current standards (link to standards) and Interpretations (http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=INTERPRETATIONS&p_toc_level=0&p_keyvalue=) will assist you in determining the best examples to use for your training.

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The information contained in this publication is not considered a substitute for any provisions of the Occupational Safety and Health Act of 1970 or for any standards issued by OSHA.

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The 100 Most Frequently Cited OSHA Construction Standards in 1991: A Guide for the Abatement of the Top 25 Associated Physical Hazards

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Occupational Safety and Health Administration
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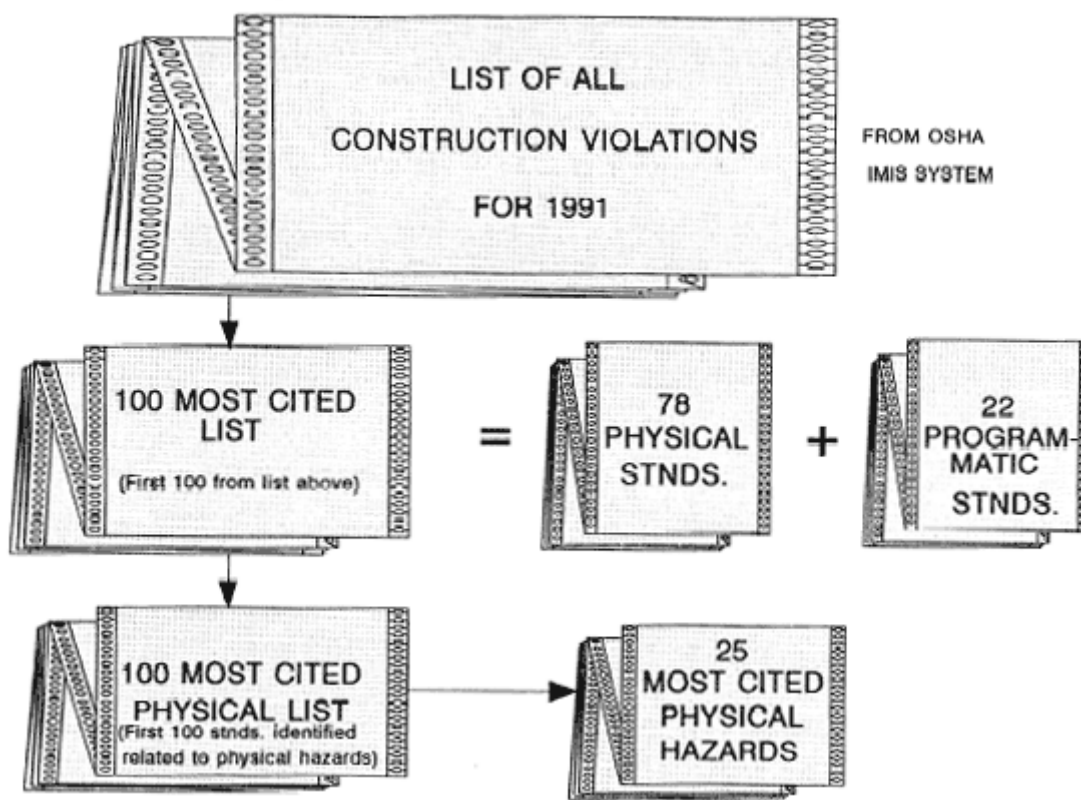
ABSTRACT

This report is intended to help employers and employees identify and correct hazards related to the most frequently cited OSHA standards found on construction sites throughout the United States. The report also is designed as a resource document for OSHA field personnel. The 100 most cited construction standards for 1991 are presented in the report. The standards cited were checked against similar citations for the years 1987 thru 1990. The relative rankings of the standards cited are similar, affected mostly as a result of the incorporation of new standards. The list was compiled from the OSHA Integrated Management Information System (IMIS). It includes citations by Federal OSHA in the 27 Federal Plan States for employers engaged in construction activities defined by Standard Industrial Classifications (SIC) 15, 16, 17. Citations issued by states operating OSHA approved state plans are not included. A listing of the 100 most cited construction standards related to physical conditions on job sites also is included. This second list does not include citations for so called "paperwork" requirements such as the hazard communications standard ([29 CFR] 1926.59) and safety training and education (1926.21) but does include citations for standards such as hard hats (1926.100), guards for open sided floors (1926.500), etc. The report also examines in detail the top 25

construction hazards relating to physical conditions. Information on the 25 standards includes, among other things: 1) citation and text of the standards; 2) intent and application of the standard; 3) hazards associated with the standard; 4) example case histories related to the standard; 5) suggested abatement of hazardous conditions related to the standard; and 6) additional source materials including interpretation, compliance directives, industry standards, etc., which may aid in the compliance with a given standard.

Keywords: 100 Most Cited; OSHA Standards; Cited Standards; Physical Hazards; Hazard Abatement; Most Cited Construction Standards

Simplified Flow Chart of Contents of Report



1.0 INTRODUCTION

Fatalities and injuries due to accidents continue to besiege the construction industry. In an effort to help employers, employees and OSHA compliance personnel (CSHO's) identify hazards that are causing accidents, OSHA has compiled listings in this report of the 100 Most Cited Standards in the construction industry. The purposes of the report are to: 1) identify the hazards causing accidents that are associated with the most frequently cited OSHA construction standards; 2) educate the employer, employee and CSHO on hazards found on construction sites and to offer suggestions for eliminating, controlling or mitigating the hazards; 3) notify employers of the types of violations on construction sites that OSHA personnel find most frequently; and 4) provide information in a format that would be readily useable for safety talks, tool box meetings, etc.

The first part of this report contains two lists:

The first list includes the 100 most frequently cited construction standards. The second list of 100 covers only those citations for standards related to physical conditions on a job site. This list does not include citations for so called "paperwork" requirements such as the hazard communications standard (Code of Federal Regulations - Title 29 [CFR 29], 1926.59) and safety training and education (1926.21) but does include citations for standards such as hard hats (1926.100), guards for open sided floors (1926.500), etc. The report refers to the first list as the 100 Most Cited List and the second list as the 100 Most Cited Physical

List.

The second part of this report (Chapters 4 and 5) focuses on the top 25 construction hazards from the 100 Most Cited Physical List and serves as a guide to the elimination, control and or mitigation of the physical hazards addressed by the standards cited.

The most cited lists were compiled from the OSHA Integrated Management Information System (IMIS). The IMIS system contains, among other information, a record of all the citations that were issued for each inspection conducted. The lists were generated using 1991 calendar year data for citations issued to employers in the Standard Industrial Classification (SIC) 15, 16, and 17, for construction. Data also are presented for a five-year period that show that the most cited standards tend to be consistent over a period of years with the rankings altered mostly by the addition of new standards. The data used in this report were drawn from the 27 Federal plan states. Data for states operating OSHA approved state plans are not included.

The 100 Most Cited List contains standards related to both physical and programmatic requirements. For this report a programmatic standard means a standard that could not be identified as the primary physical cause of an accident, but had the programmatic elements been in place and fully implemented might have precluded the hazardous condition(s) that led to the accident from ever existing. Programmatic standards are usually educational or information based such as Hazard Communication standards, recordkeeping requirements, OSHA poster, general safety/health training requirements, or written programs such as respirator, fire prevention plans, etc.

Although this report emphasizes physical hazards and hazard abatement, it cannot be emphasized strongly enough, however, that **a complete and effective safety and health program must contain all the programmatic elements** as well as the elements which address physical hazards. The elements of a thorough and effective jobsite safety program are listed in FIGURE 1-1 (see page 4).

If hazards addressed by the 100 Most Cited Lists do not exist on a particular site one should not conclude that there are no other hazardous conditions that might contribute to an accident. To the contrary, OSHA recognizes that a large percentage of accidents occur due to hazardous conditions that are not covered by specific standards. OSHA standards are only **minimum** requirements to run a safe and healthful construction site. Therefore, all parties involved with a site must continually identify all hazardous conditions, whether addressed by OSHA standards or not, to achieve a safe and healthful work site.

The 100 Most Cited Physical List ranks the most frequently cited standards that constitute actual physical hazards. This list consists of 78 standards included in the 100 Most Cited List (22 standards from the 100 Most Cited List were programmatic) and 22 other identified physical hazards. Much of the emphasis in this report is placed on controlling physical hazards. A physical hazard is defined in this document as a hazard that can be eliminated, controlled and/or mitigated by: 1) using some type of hardware, i.e. guard rails to prevent falls, body belt/harness-lanyard-lifeline to mitigate the effects of a fall, flash arrestors in safety cans to prevent a fire/explosion, a fire extinguisher to control or mitigate the effects of an incipient stage fire; or 2) a specific inspection protocol designed to identify defects which can lead to accidents such as the monthly inspections of critical items of crawler, locomotive and truck cranes prescribed by 29 CFR 1926.550(b)(2). A physical hazard can directly cause an accident; conversely, a programmatic violation would not have a direct physical linkage to the direct or primary cause of an accident.

The **GUIDE** in the second part of the report provides detailed information for the first 25 standards on the 100 Most Cited Physical List. The **GUIDE's** format lends itself to safety meetings, tool box talks, etc. Chapter 4 (see page 27) describes the **GUIDE**, its format and use. The **GUIDE** itself can be found in Chapter 5 (see page 31).

Twenty-five physical standards were chosen for the **GUIDE** because all other individual standards were cited less than 0.5 percent of the total number (approximately 62,000) of citations issued to construction contractors in 1991. Citations associated with the 25th Most Cited Physical Standard, for example, account for only one-half of one percent of all construction violations.

**FIGURE 1-1
EMPLOYER'S SAFETY AND HEALTH PROGRAM 1291**

A. Management's Commitment and Leadership

1. Policy statement: goals established, issued, and communicated to employees.
2. Program revised annually.
3. Participation in safety meetings, inspections; agenda items in meetings.
4. Commitment of resources is adequate.
5. Safety rules and procedures incorporated into site operations.
6. Management observes safety rules.

B. Assignment of Responsibility

1. Safety designee on-site, knowledgeable and accountable.
2. Supervisors (including foreman) safety and health responsibilities understood.
3. Employees adhere to safety rules.

C. Identification and Control of Hazards

1. Periodic site safety inspection program involves supervisors.
2. Preventive controls in-place (PPE, maintenance, engineering controls).
3. Action taken to address hazards.
4. Safety committee, where appropriate.
5. Technical references available.
6. Enforcement procedures by management.

D. Training and Education

1. Supervisors receive basic training.
2. Specialized training taken where needed.
3. Employee training program exists, is on-going and is effective.

E. Recordkeeping and Hazard Analysis

1. Records maintained of employees illnesses/injuries and posted.
2. Supervisors perform accident investigations, determine causes and propose corrective action.
3. Injuries, near misses and illnesses are evaluated for trends, similar causes; corrective action initiated.

F. First Aid and Medical Assistance

1. First-aid supplies and medical services available.
2. Employees informed of medical results.
3. Emergency procedures and training where necessary.

2.0 THE 100 MOST FREQUENTLY CITED OSHA CONSTRUCTION STANDARDS

The following section lists the construction standards most frequently cited in 1991. The information is presented in list form which will be referred to as the 100 Most Cited List. Table 2-1 (see page 7) list the 100 Most Cited Construction Standards in 1991. This table also ranks these standards relative to 1991 for the years 1987 thru 1990. The 100 Most Cited List gives a ranking from the first most frequently cited construction standard to the 100th most cited and provides the standard number, a brief description and its ranking for 1991 relative to the years 1987-1990. The 100 Most Cited list contains standards that are related to both physical and programmatic requirements. A programmatic requirement, for this list, means a standard that could not be identified as the primary physical cause of an accident. Programmatic elements supplement

physical hazard standards and if they are fully implemented, may prevent hazardous condition(s) that lead to accidents. Programmatic standards are usually educational or information based and cover injury and illness record keeping requirements, Hazard Communication requirements, etc.

No in-depth analysis was conducted to determine the reason(s) for any changes in a standard's rankings in the earlier years. However, the biggest factor for change appears to be the implementation of new standards. For example, the Hazard Communication Standard was not enforced in construction because of legal proceedings until March 1989. The immediate result was that three provisions of the Hazard Communication Standard were ranked #1, #2 & #3 in the 100 Most Cited List starting in 1989. This pattern is consistent for other implemented standards during this period. Generally, except for the new standards previously mentioned, the ranking of the individual standards did not significantly change during the five-year period.

Another list related to the 100 Most Cited List is presented in Table 2-2 (see page 12), which lists the percentage of the total number of (approximately 62,000 violations) cited under each of these standards in 1991.

A chart illustrates the number of PHYSICAL standards vs. the number of PROGRAMMATIC standards cited in the 100 Most Cited List, (see Figure 2-1, page 14). The relatively high number of programmatic violations (22%) might be an indicator of several things such as: 1) a higher degree of noncompliance with the programmatic requirements that are mostly performance oriented; 2) a larger emphasis by CSHO's on programmatic violations; or 3) a higher degree of compliance with specification standards that are mostly addressed by the physical standards. Consequently, the potential number of specification type violations might be fewer on jobsites.

Another chart illustrates from which Subpart, i.e. Subpart N, O, X, etc. each of the standards from the 100 Most Cited List originates, (see Figure 2-2, page 15). This chart directs and assists those who know which Subparts of the standards are the most applicable to his/her operation. With the specific Subparts, the numbers listed for the Subparts of interest can be cross-referenced with the 100 Most Cited List to find the requirements that relate to the operation.

TABLE 2-1
100 MOST CITED CONSTRUCTION STANDARDS AND THEIR RELATIVE RANKING TO 1991

STANDARDS [1926 UNLESS NOTED]	DESCRIPTION	RELATIVE RANKING TO 1991				
		YEARS				
		1991	1990	1989	1988	1987
59(e)(1)	WRITTEN HAZ. COMM. PROGRAM	1	1	1	**	**
59(h)	EMPLOYEE TRAINING HAZ. COMM.	2	2	2	**	**
59(g)(1)	MSDS FOR HAZ. CHEMICALS	3	3	3	**	**
1903.2(a)(1)	OSHA POSTER	4	4	4	1	2
59(g)(8)	ACCESSIBLE COPIES OF MSDS	5	5	12	**	**
21(b)(2)	SAFETY TRAINING/RECOGNITION OF UNSAFE CONDITIONS	6	7	10	3	6
500(d)(1)	GUARDING OPEN SIDED FLOORS	7	8	8	5	4
100(a)	HEAD PROTECTION	8	10	7	6	5
404(b)(1)(i)	GROUND FAULT PROTECTION	9	6	5	2	1

404(f)(6)	ELECTRICAL GROUNDING	10	9	6	4	3
20(b)(1)	ACCIDENT PREVENTION PROGRAM	11	11	9	7	7
652(a)(1)	PROTECTIVE SYSTEMS FOR TRENCH/ EXCAV.	12	15	*	*	*
451(d)(10)	GUARDRAIL SPEC. FOR TUBULAR WELDED SCAFFOLDS	13	13	13	9	11
1904.2(a)	OSHA 200 LOG	14	12	11	8	9
28(a)	PPE USED FOR SPECIFIC OPERATION	15	14	14	10	8
1052(c)(1)	STAIR RAIL REQUIRED @ 30"	16	*	*	*	*
152(a)(1)	STORMING AND HANDLING FLAMM. OR COMB. LIQUIDS	17	17	15	12	14
20(b)(2)	ACCIDENT PREVENTION INSPECTIONS	19	15	17	20	49
651(k)(1)	INSPECT. OF PHYSICAL COMPONENTS OF TRENCH/PROTECT. SYSTEM	20	22	*	*	*
451(a)(13)	SAFE ACCESS FOR SCAFFOLDS	21	25	25	27	33
404(b)(1)(ii)	GROUND FAULT CIRCUIT INTERRUPTER	22	19	18	13	12
701(b)	GUARDING PROTRUDING STEEL REBARS	23	40	77	*	*
59(e)(1)(i)	LIST OF HAZ. CHEMICALS	24	31	50	**	**
451(a)(4)	SCAFFOLD GUARDING SPEC's.	25	21	19	17	19
651(j)(2)	SPOIL PILE PROTECTION	26	28	27	25	27
350(j)	WELDING AS PER ANSI Z49.1- 1967	27	28	27	25	27
350(a)(9)	SECURING COMPRESSED GAS CYLINDERS	28	27	24	19	20
1910.20(g)(2)	COPY OF 1910.20 STND. AVAILABLE	29	35	20	40	96
102(a)(1)	EYE/FACE PROTECTION	30	26	29	29	28
1910.20(g)(1)(i)	INFORMING OF MEDICAL ACCESS	31	62	40	*	*
1053(b)(1)	LADDER EXTENDED 3' ABOVE LANDING	32	*	*	*	*
500(b)(1)	GUARDING FLOOR OPENING	33	23	22	16	16
651(c)(2)	ACCESS/EGRESS FROM TRENCH/EXCAV.	34	32*	(2)	*	*
1910.20(g)(1)(iii)	RIGHT OF ACCESS TO MEDICAL RECORDS	35	63	43	*(5)	*
403(b)(2)	LISTED, LABELED OR CERT. EQUIP.	36	34	59	68	78
405(a)(2)(ii)(j)	FLEXIBLE CORDS DESIGNED FOR HARD OR EXTRA HARD USAGE	37	33	33	22	21
1910.20(g)(1)(ii)	FLEXIBLE CORDS DESIGNED FOR HARD OR EXTRA HARD USAGE	38	69	46	*	*
405(g)(2)(iv)	STRAIN RELIEF FOR CORDS	39	38	42	38	51
59(f)(5)(i)	LABEL SPEC. - HAZ. CHEMICAL(S)	40	39	45	**	**

304(f)	WOODWORKING TOOLS AS PER ANSI 01-1.1967	41	43	34	23	17
105(a)	SAFETY NETS ABOVE 25'	42	52	48	43	59
300(b)(2)	MACHINE GUARDING - MOVING PARTS	43	42	39	35	29
59(f)(5)(ii)	LABEL SPEC. - HAZ. COMM.	44	50	65	**	**
405(a)(2)(ii)(e)	PROTECTION TEMPORARY LIGHTING	45	48	38	26	34
500(c)(1)	GUARDING WALL OPENING	46	58	57	44	41
403(i)(2)(i)	ACCESS TO INSTALL. OVER 600 VOLTS	47	45	49	37	36
451(e)(10)	GUARDING SPEC. FOR MOBILE SCAFFOLDS	48	46	41	34	37
451(d)(3)	BRACING OF TUBULAR WELDED SCAFFOLD	49	55	56	48	54
5(a)(1)	GENERAL DUTY CLAUSE	50	30	54	65	73
404(f)(7)(iv)(c)	GROUNDING SPECIFIC TYPES OF EQUIP.	51	53	32	30	31
59(e)(4)	ACCESSIBILITY OF THE WRITTEN HAZ. COMMUNICATION PROGRAM	52*	54	**	**	*
50(f)	EMERGENCY NUMBERS POSTED	53	36	26	15	13
1051(a)	ACCESS BY LADDER/STAIRWAY @ CHANGE IN ELEVATION > 19"	54	*	*	*	*
405(b)(2)	COVERS FOR PULL BOXES, JUNCTION BOXES, OUTLETS, ETC.	55	61	58	54	47
416(e)(1)	WORN AND FRAYED ELECTRICAL CORDS	56	57	62	55	81
451(a)(2)	LOAD DESIGN FOR SCAFFOLDS	57	60	66	59	61
405(b)(1)	UNUSED OPENING IN BOXES	58	70	74	64	64
550(b)(2)	CRANES - ANSI B30.5-1968	59	65	63	50	52
451(e)(4)	TIGHTLY PLANKED MOBILE SCAFFOLD	60	51	47	42	45
404(a)(2)	REVERSE POLARITY OF CONDUCTORS	61	59	61	45	39
1053(b)(16)	DEFECTIVE PORTABLE LADDER	62	*	*	*	*
405(a)(2)(ii)(i)	PROTECTION OF FLEXIBLE CORDS AND CABLES	63	44	37	28	25
1060(a)	TRAINING PROGRAM FOR LADDERS	64	*	*	*	*
602(a)(9)(i)	HORNS ON BIDIRECTIONAL EQUIP.	65	78	83	57	53
500(g)(1)	FALL PROTECTION FOR LOWPITCHED ROOFS	66	76	85	78	79
50(c)	CERTIFIED FIRST-AID PERSONNEL	67	80	84	73	93
500(b)(8)	GUARDING FLOOR HOLES	68	79	73	60	58
451(a)(14)	EXTENSION OF PLANKING -	69	67	93	69	94

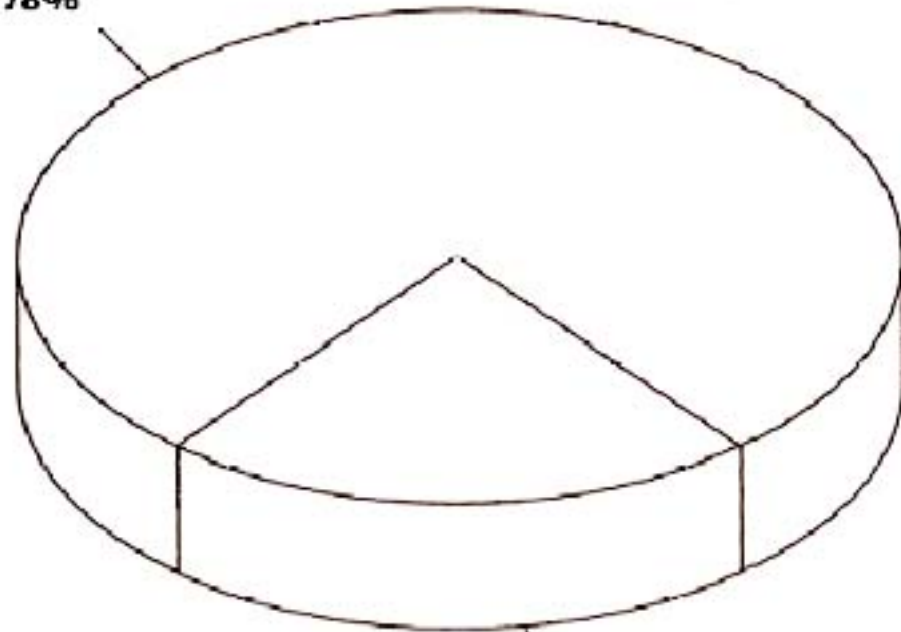
405(g)(2)(iii)	ELECTRICAL CORDS LESS THAN NO.12	70	81	78	70	67
556(b)(2)(v)	BELT/LANYARD - AERIAL LIFTS	71	73	80	74	77
150(a)(1)	FIRE PROTECTION PROGRAMS	72	87	69	46	32
451(e)(8)	PLUMB/SOUND BASE FOR MOBILE SCAFFOLDS	73	68	79	72	68
50(d)(1)	ACCESSIBLE FIRST-AID SUPPLIES	74	66	52	36	30
59(e)(1)(ii)	NON-ROUTINE INFORM. - WRITING HAZ. COMM.	75	*(1)	*	**	**
403(b)(1)	ELECT. EQUIP. FREE OF HAZARDS	76	85	*	*	*
500(d)(2)	GUARDING RUNWAY	77	84	72	64	*
451(e)(5)	LADDER/STAIRWAY FOR ACCESS/EGRESS	78	*	99	96	99
602(a)(9)(ii)	BACKUP ALARM PROVIDED	79	74	82	56	46
150(c)(1)(i)	FIRE EXTINGUISHER EVER 300 FT.2 OR 100 FT. TRAVEL	80	49	44	39	38
405(a)(2)(ii)(b)	BRANCH CIRCUIT SPECIFICATIONS	81	92	94	76	75
450(a)(9) 8	TIMPER MEMBER OF SCAFFOLD FRAMING	82	24	23	18	1
59(f)(5)	LABELING HAZ. CHEMICALS	83	56	70	**	**
59(h)(1)	EMPLOYEE INFORMATION	84	88	71	**	**
404(b)(1)(iii)	ASSURED EQUIP. GROUNDING CONDUCTOR PROGRAM	85	*	*	81	83
500(e)(1)(iv)	RAILING ON STAIRWAY	86	29	28	21	22
1052(b)(1)	STAIRWAY TRAVEL WITH EMPTY PANS	87	*	*	*	*
450(a)(10)	SECURING PORTABLE LADDERS	88	20	21	14	15
300(b)(1)	POWER OPERATED TOOL GUARDS	89	91	81	67	65
350(a)(1)	VALVE PROTECTION CAPS	90	75	68	61	66
405(a)(2)(iii)	GUARDING PROTECTING TEMP. WIRING OVER 600 VOLTS	91	*(5)	*(5)	*(5)	*(5)
405(a)(2)ii)(f)	TEMP. LIGHTS FROM ELECT. CORDS	92	97	*	98	72
451(a)(3)	SUPERVISION DURING ERECTION,ETC.	93	*(5)	*(5)	*(5)	*(5)
602(a)(2)(i)	SEAT BELTS FOR EARTHMOVING EQUIP.	94	*(5)	*(5)	95	91
1052(c)(12)	GUARDING FOR STAIRWAY EDGES	95	*(5)	*(5)	*(5)	*(5)
1053(b)(8)	SECURING LADDERS	96	*	*	*	*
59(e)(2)	MULTI-EMPLOYER(S) WORKPLACES - WRITTEN HAZ. COMM. PROVISION	97	83	*(1)	**	**
451(d)(4)	FOUNDATION SPEC. FOR TUBULAR WELDED SCAFFOLD LEGS	98	98	95	*(5)	*(5)

451(a)(10)	SCAFFOLD GRADE PLANKING	99	95	*(5)	*(5)	*(5)
550(a)(6)	ANNUAL INSPECTION OF CRANES	100	93	88	79	76

- (1) Full enforcement of Hazard Communication Standard began in March, 1989.
- (2) Trenching/Excavation Standard became effective on March 5, 1990.
- (3) Ladder/Stairway Standard became effective January, 1991.
- (4) Standard first included in Concrete/Masonry Standard- effective August 15, 1988.
- (5) Particular standard was not one of the 100 most frequently cited in the reference year.
- (6) Standard was part of old Ladder & Stairway Standards and was effectively discontinued January 1991.

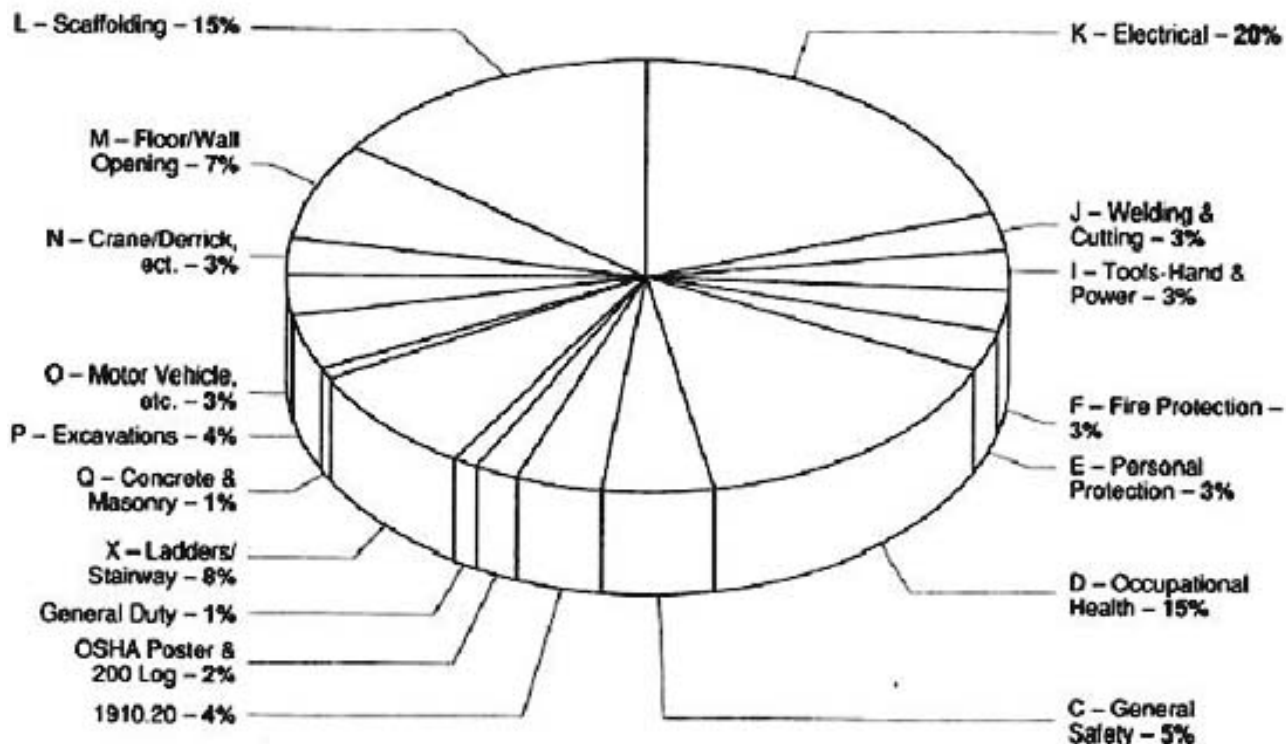
Frequency of Programatic vs. Physical Violations
100 Most Cited Violation — 1991

**Physical
Violations — 78%**



**Programatic
Violations — 22%**

Distribution of the 100 Most Frequently Cited Standards by Subpart



3.0 100 MOST CITED PHYSICAL LIST

The next section presents the 100 Most Cited Physical List. A physical hazard can be the actual cause(s) of an accident. A physical hazard as defined by his report is: 1) one that can be abated (eliminated, controlled and/or mitigated) by using some type of hardware i.e., guard rails to prevent falls; or 2) following a specific inspection protocol designed to identify defects that can lead to accidents such as the monthly inspections of critical items of crawler, locomotive and truck cranes which are prescribed by 1926.550(b)(2).

The 100 Most Cited Physical List presented in Table 3-1 (see page 18) ranks the most frequently cited physical standard from #1 to #100, describes the **major** activity related to the standard, profiles the standard and gives the standard number.

Other lists help identify which of the 100 standards are related to major subjects and subdivisions of each i.e., major subject - ELECTRICAL; subdivisions - GROUND FAULT PROTECTION, CORD SPECIFICATIONS., etc., see Table 3-2 (page 22) & Table 3-3 (page 23).

TABLE 3-1
LIST OF THE 100 MOST FREQUENTLY CITED OSHA CONSTRUCTION STANDARDS
RELATED TO PHYSICAL HAZARDS IN 1991

RAN K	DESCRIPTION OF STANDARD		STANDARD (1926. ____)
1	Fall Protection	Guarding open sided floors/platforms	500(d)(1)
2	PPE	Head protection from impact, falling or flying objects	100(a)
3	Electrical	Ground fault protection	404(b)(1)(i)

4	Electrical	Path to ground missing or discontinuous	404(f)(6)
5	Trench/Excavation	Protective Systems for trenching/excavation	652(a)(1)
6	Scaffolding	Guardrail specifications for tubular welded frame scaffolds	451(d)(10)
7	PPE	Appropriate PPE used for specific operation	28(a)
8	Ladders/Stairways	Stair rails required @ 30" change of elevation or 4 risers	1052(c)(1)
9	Fire Protection	Approved containers or tanks for storing or handling flammable or combustible liquids.	52(a)(1)
10	General Provisions	General Housekeeping	25(a)
11	Trenching/Excavation	Daily inspection of physical components of trench and protection systems	651(k)(1)
12	Scaffolds	Safe access for all types of scaffolds	451(a)(13)
13	Electrical	Ground fault circuit interrupters (GFCI's)	404(b)(1)(ii)
14	Concrete/Masonry	Guarding protruding steel rebars	701(b)
15	Scaffolds	General requirements for guarding	451(a)(4)
16	Trench/Excavation	Spoil pile protection	651(j)(2)
17	Welding/Cutting	Securing compressed gas cylinders	350(a)(9)
18	Welding/Cutting	Additional rules for welding as per ANSI Z49.1-1967	350(j)
19	PPE	Eye/Face Protection for operations which create exposure	102(a)(1)
20	Fall Protection	Guarding floor openings	500(b)(1)
21	Ladder/stairway	Ladder extended 3' above landings	1053(b)(1)
22	Trench/excavation	Access/Egress from trench/excavation	651(c)(2)
23	Electrical	Listed, labeled or certified equipment used in manner prescribed	403(b)(2)
24	Electrical	Flexible cords designed for hard or extra hard usage	405(a)(2)(ii)(j)
25	Electrical	Strain relief for cords	405(g)(2)(iv)
26	Woodworking Tools	Additional rules for woodworking tools as per ANSI 01.1-1967	304(f)
27	Fall Protection	Safety nets above 25' when no other means of fall protection is practical	105(a)
28	Tools	Guarding moving parts of machinery	300(b)(2)
29	Electrical	Protection and grounding for temporary lamps	405(a)(2)(ii)(e)
30	Electrical	Controlled access to installations operating at over 600 volts	403(i)(2)(i)
31	Fall Protection	Guarding wall openings	500(c)(1)

32	Scaffolding	Guarding specifications for mobile scaffolds	451(e)(10)
33	Scaffolding	Bracing tubular welded frame scaffolds	451(d)(3)
34	General Duty	Serious hazard not covered by specific standard	5(a)(1)
35	Electrical	Specific types of equipment or operations where grounding is required	404(f)(7)(iv)(c)
36	Health	Emergency phone numbers posted	50(f)
37	Ladder/Stairway	Access by means of ladder/stairway when no other means provided and change in elevation > 19"	1051(a)
38	Electrical	Covering provided for pull boxes, junction boxes, outlets, etc.	405(b)(2)
39	Electrical	Worn or frayed electrical cords	416(e)(1)
40	Scaffolding	Sound, rigid, and load capable footings or anchorages for all types of scaffolds	451(a)(2)
41	Electrical	Unused opening in boxes must be closed and conductors entering boxes must be protected from abrasion.	405(b)(1)
42	Cranes/Derricks	All crawler, truck, or locomotive cranes meet ANSI B30.5-1968	550(b)(2)
43	Scaffolding	Tightly planked mobile scaffolds	451(e)(4)
44	Electrical	Reverse polarity of conductors	404(a)(2)
45	Ladders/Stairways	Defective portable ladders tagged and taken out-of-service	1053(b)(16)
46	Electrical	Protecting flexible cords and cables from damage	405(a)(2)(ii)(i)
47	Matl. Handling Equip.	Horns provided on bi-directional equipment	602(a)(9)(i)
48	Health	Certified first-aid trained personnel when treatment is not readily available	50(c)
49	Fall Protection	Components of a fall protection system for low-pitched roof work	500(g)(1)
50	Fall Protection	Guarding floor holes	500(b)(8)
51	Scaffolding	Specifications for extension of planking beyond supports	451(a)(14)
52	Fire	Provide for firefighting equipment and a fire protection program.	150(a)(1)
53	Electrical	Splicing and tapping electrical cords less than No. 1219	405(g)(2)(iii)
54	Fall Protection	Body belt and lanyard while working from aerial lift	556(b)(2)(v)
55	Scaffolding	Plumb and sound base for mobile scaffold casters locked	451(e)(8)

56	Health	Accessible first-aid supplies approved by consulting physician	50(d)(1)
57	Electrical	Electrical equipment is free of hazards as determined by specifications.	403(b)(1)
58	Fall Protection	Guarding runways	500(d)(2)
59	Scaffolding	Ladder/stairway affixed or built-in to mobile scaffold for access/egress	451(e)(5)
60	Matl. Handling Equip.	Backup alarm or signalman provided when operating in reverse	602(a)(9)(ii)
61	Fire	Fire extinguisher for every 3000 sq. ft. of protected building area and 1000 feet of travel	150(c)(1)(i)
62	Electrical	Branch circuit specifications	405(a)(2)(ii)(b)
63	Ladders/Stairways	Ladders extended 3' above landing	450(a)(9)
64	Electrical	Assured equipment grounding conductor program	404(b)(1)(iii)
65	Ladders/Stairways	Stair rail and handrail specifications	500(e)(1)(iv)
66	Ladders/Stairways	No travel on stairways with empty pans	1052(b)(1)
67	Ladders/Stairways	Securing portable ladders	450(a)(10)
68	Tools	Power operated tool guards	300(b)(1)
69	Welding/Cutting	Valve protection caps in-place and secure	350(a)(1)
70	Electrical	Guarding provided for temporary wiring operating over 600 volts	405(a)(2)(iii)
71	Scaffolding	Competent person supervision during erection, dismantling, etc.	451(a)(3)
72	Electrical	Temporary lights suspended from electrical conductor cords	405(a)(2)(ii)(f)
73	Matl. Handling Equip.	Seat belts for all earth moving equipment	602(a)(2)(i)
74	Ladders/Stairways	Guarding stairway edges and landings	1052(c)(12)
75	Ladders/Stairways	Siting and securing ladders	1053(b)(8)
76	Scaffolding	Scaffold grade planking or equivalent	451(a)(10)
77	Scaffolding	Foundation specifications for tubular welded frame scaffold Legs	451(d)(4)
78	Cranes/Derricks	Annual inspection of cranes/derricks	550(a)(6)
79	Cranes/Derricks	Barricading the swing radius of cranes/derricks	550(a)(9)
80	Fire	Specifications for fire extinguisher on each floor of multi-story Structure	150(c)(1)(iv)
81	Ladders/Stairways	Stairrail specifications	500(e)(1)(iii)

82	Scaffolding	Tie specifications for tubular welded frame scaffolds	451(d)(7)
83	Fire	Inspection of fire extinguisher in accordance with NFPA 10A-1970	150(c)(1)(viii)
84	Electrical	Deenergizing or guarding electrical circuits which are in proximity of employees	416(a)(1)
85	Scaffolding	Immediate replacement or repair of any damaged or defective components of scaffolding systems	451(a)(8)
86	Trenching/ Excavating	High-visibility garments when exposed to vehicular traffic	651(d)
87	Health	Common drinking cup	51(a)(4)
88	Fire	"NO SMOKING" signs posted in service and refueling areas	152(g)(9)
89	Fire	Fire extinguisher for cranes/derricks	550(a)(14)(i)
90	Ladders/Stairways	Swing radius specifications for doors/gates which open on to a stairway or landing	1052(a)(4)
91	Scaffolding	Lifeline support on suspension scaffolds	451(i)(8)
92	Scaffolding	Specifications for catch platform for "steep-slope" roofs	451(u)(3)
93	Matl. Handling Equip.	Industrial trucks (fork lifts) meet ANSI B56.1-1969	602(c)(1)(vi)
94	Motor Vehicles	Specifications for using vehicles with obstructed views to rear	601(b)(4)
95	Fire	Fire extinguisher specifications for locations near flammable/combustible materials	150(c)(1)(vi)
96	Welding/Cutting	Regulators/gauges kept in proper working order	350(h)
97	Cranes/Derricks	Competent person to inspect crane to identify defects prior to use	550(a)(5)
98	Fire	Periodic inspection of firefighting equipment	150(a)(4)
99	Fire	Storing liquefied petroleum gases in buildings	153(j)
100	Scaffolding	Locking or pinning legs to prevent uplift	451(d)(6)

4.0 FORMAT AND USE OF GUIDE

The following chapter describes the **GUIDE**. The format discusses the headings for each particular **GUIDE** Sheet.

4.1 USE OF GUIDE

The **GUIDE** consist of 25 user-friendly data sheets covering the first 25 standards from the 100 Most Cited Physical List. Each two page **GUIDE** is accompanied by photographs or illustrations depicting acceptable and unacceptable conditions related to the standard. Captions describe the photograph or illustration and identify an acceptable or unacceptable condition. The following key specifies an acceptable or unacceptable condition:

VIOLATION IN-COMPLIANCE Acceptable condition

VIOLATION IN-COMPLIANCE Unacceptable condition

Note: The photographs and illustrations may identify other conditions than those addressed by the particular **GUIDE**. The caption, however, only mentions the situation germane to that **GUIDE**.

These **GUIDE** are intended to be usable information or a training source for safety talks, tool box meetings, etc.

Much of the information contained in the **GUIDE SHEETS** is taken from OSHA field personnel with many years of field experience. The **GUIDE**, therefore, gives the contractor some insight into the types of conditions the OSHA CSHO observes on the Job-site.

Statistical data presented in the individual **GUIDE** related to fatalities were taken from an OSHA report (see Section 5.3 REFERENCES - [10]) developed from OSHA accident investigation data.

Data presented related to injuries came from an OSHA report (see Section 5.3 REFERENCES [6]) which was based on the Bureau of Labor Statistics - Supplementary Data System (SDS).

4.2 FORMAT

This section identifies information and sources, where applicable, that are found in each the sub-headings in the individual **GUIDE** in Chapter 5.

Heading

Gives the ranking of the particular standard or **GUIDE** on the 100 Most Cited Physical List, the standard number and a brief key word description of the standard.

Rule

Quotes the standard.

Intent

States the intent and/or the purpose of the standard. For example, a fall prevention system may be required on a scaffold to prevent falls from elevations. The intent of a corresponding standard might be to specify the construction of a guard rail system. While this sub-heading specifies the requirements of the standard, it might also include information on: 1) the history of a particular hazard related to the standard, i.e., a certain number of fatal/lost-time falls from scaffolds over a given period of time; and 2) the theory or operation or equipment, loss prevention technique, etc. which might be associated with the standard.

Hazards

Lists the most commonplace hazards associated with the standard. Additionally, lists common probable injuries identified with the listed hazard. **NOTE:** No attempt is made to list all hazards associated with the specific standard because of the numerous hazardous conditions and situations that each standard may cover. The employer must first evaluate the situation/condition and identify all the hazards. Secondly, the employer must decide which standards apply and then take the appropriate actions required by the standard to abate the hazards.

(Among Other) Suggested Abatements

Lists at least one common and sometimes obvious abatement method to correct the hazard(s) associated with the particular standard. **NOTE:** As above, there may be many acceptable means of abatement for hazard(s) related to the standard. Also, the abatement methods listed **MAY NOT** cover the situation/condition at any given jobsite. Therefore, it is incumbent upon the employer to evaluate the operation to insure the abatement is adequate to control or eliminate the hazard.

The employer must identify, control or eliminate all hazards (29 CFR 1926.20 & .21) on the jobsite through an effective and **implemented** safety program. The elements of a thorough jobsite safety program are listed in FIGURE 1-1 - EMPLOYER'S SAFETY AND HEALTH PROGRAM[29] (see page 4). The elements listed in FIGURE 1-1 apply to controlling any hazard on any jobsite including those listed in this report. Therefore, these common abatement methods are not listed on each **GUIDE**, but must be followed to achieve a safe and healthful work place.

Selected Case Histories

Lists at least one fatal/catastrophic accident where the particular standard was cited and was directly related to the causes) of the accident. The accident cases were extracted from the OSHA IMIS System which contains accident information in an abstract format from the OSHA-1 70 Form (codified form used by OSHA CSHO's when investigating fatal or catastrophic accident) and from various OSHA Fatal Facts Accident Reports. This section offers a reader or employee(s) at safety meetings/tool box talks an idea of possible consequences if the requirements of the standard are not followed.

Comments

Lists at least one comment related to the standard, giving information such as the number of times the standard was cited during OSHA accident/catastrophe investigations, common observations from OSHA field personnel related to the standard, common conditions found in the field that do not meet the requirements of the standard, etc.

Additional Documents to Aid in Compliance

Lists other documents that are directly related to the particular standard and provides supplement information to the employer, employee or CSHO. However, it is important to understand that other industry/operational documents may be used to support OSHA violations. The other listed non-OSHA documents carry the same legal impact if they are incorporated by reference listed in the OSHA standards with a specific standard number such as **ANSI 249.1 - 1967 Safety in Welding and Cutting**, which is listed as OSHA standard 1926.3500)). Other documents may be used as criterion documents to illustrate industry practice to support a "General Duty Clause 5(a)(1)" violation.

Additionally all pertinent current and historic OSHA documents listed in the OSHA Computer Information System (OCIS) including directives, compliance letters, individual letters of interpretation, etc. have been listed by date with a synopsis of the associated information to help interested parties research the standard.

Bracketed numbers, i.e. [29], refer to corresponding documents listed in APPENDIX B-REFERENCES.

Photographs, Illustrations and Other Documents

This section uses photographs and/or illustrations to show some common acceptable and unacceptable situations/conditions found at construction sites related to the standard. Additionally, some of the **GUIDE** Sheets include items such as checklists and other Agency documents.

5.0 GUIDE FOR THE ABATEMENT OF THE TOP 25 MOST CITED PHYSICAL HAZARDS

The **GUIDE** consists of the following: 1) Section 5.1 contains the top 25 most frequently cited physical standards or hazards from the 100 Physical List presented in TABLE 3-1 (see page 18), each **GUIDE** is presented as an individual information/data source for each standard; 2) Section 5.2 consists of two tables related to construction specifications for guardrails and toeboards that are common for eve of the individual **GUIDE** Sheets; and 3) Section 5.8 contains a list of additional sources of further OSHA and industry information.

5.1 THE TOP 25 GUIDE SHEETS

The following section presents individual **GUIDE** Sheets to help employers, employees and OSHA personnel identify and abate the 25 most frequently cited physical hazards on construction sites.

RANK IN FREQUENCY CITED	1926.	GUARDDRAILS NOT PROVIDED FOR OPEN-SIDED FLOORS OR PLATFORMS
#1	500(d)(1)	

RULE: *Every open-sided floor or platform 6 feet or more above adjacent floor or ground level shall be guarded by a standard ramp, or the equivalent, as specified in paragraph (f)(1) of this section, on all open sides, except where there is an entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a standard toeboard wherever, beneath the open sides, persons can pass, or there is moving machinery, or there is equipment with which falling materials could create a hazard.*

INTENT:

Falls from elevations are the leading cause of fatalities in the construction industry. From 1985-1989, 33% of all construction fatalities [10] resulted from a fall from an elevation. One hundred-seventeen fatalities occurred when employees fell from open sided doors and through floor openings. This standard specifies that guarding must be provided for all open-sided floors and platforms 6 feet or more in height. It also specifies minimum requirement for the type of guarding. Paragraph (f) of the same section specifies the requirement of a standard guardrail system. TABLE 5.2-1 lists guardrail specifications for various materials. Where there is an open-sided floor/platform and there is a potential for a person to pass or a hazard is presented by machinery, toeboards are required. The intent is to contain any materials near the edge from inadvertently getting pushed over the edge where they may strike persons or machinery below. TABLE 5.2-2 lists specifications for toeboards.

HAZARDS:

- Falls from elevations: probable injuries range from death to fractures; Fall from lower elevations such as 4-6 feet have caused serious lost-time accidents and occasionally have been the cause of fatalities.
- Struck by: the lack of material containment (toeboards) has caused both fatalities and lost-time accidents when falling materials have struck employees below.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Whenever an employee must work at **any** elevated location, ask the questions: 1) Are they protected from a fall? and 2) What measures must be taken to protect the employee at the elevated work location?
- Fall prevention systems such as standard guardrail systems provide more positive means of protection than fall protection systems such as a bodybelt/harness-lanyard-lifeline combination, except when workers are suspended, i.e. working on suspended scaffolds, work platforms, etc.
- Construct/maintain all guardrail systems according to OSHA requirements.
- An acceptable method to preclude the use of toeboards, would be to determine the fall radius of materials on an open-sided floor/platform. Place positive physical barrier outside the potential fall radius to keep workers and machines outside the danger zone.

SELECTED CASE HISTORIES:

An employee taking measurements was killed when he fell backwards from an unguarded balcony to the concrete 9'6" below.

COMMENTS:

- Falls from elevations accounted for 14% of all lost-time accidents[6].
- This standard was cited in 103 fatality/catastrophe inspections conducted by OSHA over a 4 year period.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 500 & Steel Erection - 750 & 752(k); [11]; [12]; [13]; [26] Part - 701(f)(2) - Concrete and Masonry Const.

OSHA COMPLIANCE LETTER

Date 5/22/84; From-Directorate of Field Operations to Regional Administrators; Synopsis - Clarification of 1926.750(b)(1)(iii) stating that ½ " wire rope or equivalent safety railing must be used around temporary

planked or temporary metal-decked doom during steel erection operation. Raging also must be provided at leading edge if spreading stops for any significant time period. ½ " synthetic or fiber rope would not be acceptable as a required safety railing for steel erection operations.

OSHA COMPLIANCE LETTER

Date 1/13/81; From-Assistant Secretary to Int. Union of Bricklayers & Allied Craftsmen; Synopses - Standards 1926.28, 1926.104, 1926.105 & 1926.500(d)(1) do not apply to overhand bricklaying operations.

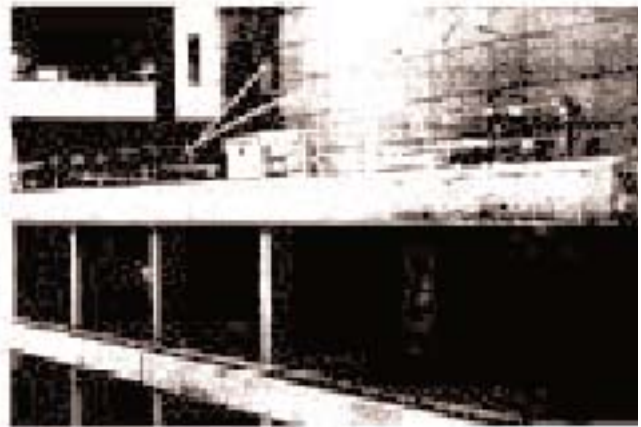
OSHA COMPLIANCE LETTER

Date 2/13/86; From-Directorate of Field Operations to Individual Company; Synopses - When structural steel assembly including decking has been completed and other trades are working on the deck while concrete is being poured on the deck, the door must be guarded in accordance with 1926.500(d)(1).

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE



VIOLATION IN-COMPLIANCE

Properly erected wire rope perimeter guardrail system.

NOTE:

The high visibility tape on wire rope (arrow) on top floor makes the guardrail easier for the employees to see.

Exposure to open-sided floor



VIOLATION IN-COMPLIANCE

Too much sag in the wire rope (arrows) guard rails



VIOLATION IN-COMPLIANCE

Properly erected wooden guardrail system for platform.

NOTE:

The top erection floor has a properly erected wire rope guardrail system.

RANK IN FREQUENCY CITED	1926.	HEAD PROTECTION FROM IMPACT, FALLING OR FLYING OBJECTS AND ELECTRICAL BURNS
#2	100(a)	

RULE: *Employees working in areas where there is a possible danger of head injury from impact, or from falling or flying objects, or from electrical shock and burns shall be protected by protective helmets.*

INTENT

Thousands of head injuries each year occur in the construction industry. This standard requires employees to wear "hard hats" to mitigate or lessen the effects of being struck by an object, accidentally striking their head against an object or making contact with an energized electrical line. It needs to be emphasized that the standard is not just for employees that work at sites where there is a possibility of falling objects striking them in the head, in workers on lower levels of a multi-story building project which are exposed to falling materials such as hand tool, bolts, nuts, etc. But it is also intended for employees who work in the vicinity of an operation that is found on a construction site. These type of energy releases are common to almost all construction operation and are not predictable. Almost all construction operations involve the potential of falling and flying objects, and, therefore, employees must wear head protection. Additionally many impact hazards exist. For instance, iron workers are constantly exposed to striking their heads on structural steel during erection, carpenters strike their heads on temporary framing lumber as they move through a building, etc. Employees that work in the vicinity of electrical conductors are exposed to potential shocks and burns to the head should they contact an uninsulated conductor.

HAZARDS

Struck by: injuries ranging from death to major concussion or trauma to minor abrasions; electrocution.

(AMONG OTHER) SUGGESTED ABATEMENT(S):

- Emphasize that the wearing of hard hats is not only for those employees that are exposed to falling objects, but it is also for employees exposed to the other types or hazards.
- Focus on the wearing of hard hats during site inspections. Check hard hats to insure their integrity is not compromised. Metal hard hats are electrical conductors and do not meet the requirement of OSHA and ANSI.
- A formal management discipline program may need to be utilized for those employees who after repeated warnings either refuse or "forget" to wear their hard hats where required.

SELECTED CASE HISTORIES

- An employee was standing under a suspended scaffold that was hosting a workman and 3 sections of ladder. Sections of the ladder became unlashd and fell 50 feet striking the employee in the skull. The employee, who was not wearing any head protection died from injuries received.
- Two employees were using a wire rope to winch a wooden tool shed onto a flat bed trailer. The wire rope broke, snapped back struck one of the employees in the top of the head, killing him. The employee was not wearing a hard hat.
- Employees were using a 5-ton winch to pull a 10-foot section of a 600 lb. grain spout through a vent hole when the spout became wedged. Employees were attempting to use pry bars to free the spout

that was still under tension from the winch when the spout popped free, striking an employee in the head. No head protection was provided.

COMMENTS

1. OSHA [6] found that in a four year period from 1985 to 1988, 3.2% (11,685) of all construction lost time accidents in 10 states were related to head injuries.
2. All lost-time accidents involving head injuries do not result from being struck by falling and flying objects. OSHA [6] found that the head was the "Part of Body" injured in 9% (7125) of the "Struck By" (falling and flying object) type injuries. This compared to 5% (1440) for "Struck Against", (impact) type injuries; in other words, impacts are the cause of about 17% of all lost time head injuries.
3. This standard was cited in 142 fatality/catastrophe inspections by OSHA in a five year period.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE

[1] Section 100 (b)& (c); [7]*; [8]*; [9], [25].

*- Referenced in 29 CFR 1926- Construction Standards

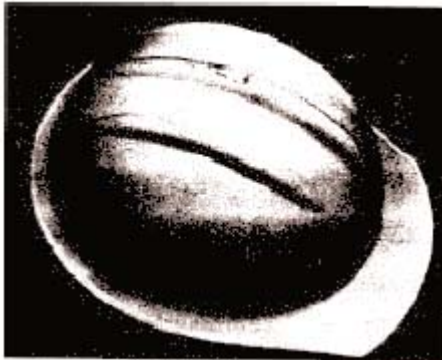
OSHA CLARIFICATION LETTER

Date 8/23/83 Synopsis The employer must determine which employees face possible head injuries and must wear appropriate head protection. OSHA has no exhaustive guidelines for determining when head protection must be worn. A case-by-case analysis must be performed by the employer.

OSHA CLARIFICATION LETTER

Date 7/22/92; From Directorate of Compliance to IBEW Business Manager Synopsis Wearing of hard hats with bill to the rear would not meet 1926.100(a) & (b) unless manufacturer certifies that this practice meets ANSI Z89.1-1969. ANSI test and certifies hard hats with bills facing forward.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Hardhat meets OSHA and ANSI Z89.1-1969, **Safety Requirements for Industrial Head Protection**

VIOLATION IN-COMPLIANCE

Work is in progress on top of scaffold. The workers drilling below scaffold are exposed to being struck by falling materials. There is a need for head protection which is not provided by the soft hats shown





VIOLATION IN-COMPLIANCE

The inspector on the ground (arrow) is exposed to falling materials. Therefore, head protection is required for him. The carpenters would most likely not be exposed to falling materials in this situation. However, a flying material hazard may exist and the operation must be evaluated to determine if head protection is required. NOTE: Fall hazards do exist at the perimeter and at the floor openings. Also, an improperly constructed ladder is being used.

RANK IN FREQUENCY CITED	1926.	GROUND FAULT PROTECTION NOT PROVIDED
#3	404(b)(1)(i)	

RULE: *General. The employer shall use either ground fault circuit Interrupters as specified in paragraph (b)(1)(III) of this section or an assured equipment grounding conductor program as specified in paragraph (b)(1)(III) of this section to protect employees on construction sites. These requirements are in addition to any other requirements for equipment grounding conductors.*

INTENT:

Due to the dynamic, rugged nature of a typical construction site, electrical equipment, especially tools and extension cords are much more susceptible to deterioration due to "normal" use and sometimes abuse. When the deterioration occurs, sometimes insulation cracks or breaks exposing bare energized conductors, stress and strain may cause terminal screws to loosen resulting in one conductor short-circuiting another, etc The result can be that fault current is generated which may be directed through an employee's body to ground. Wet conditions often found at construction sites, greatly increase this hazard. This standard offers the employer two additional methods beyond the required equipment grounding conductor, to reduce and/or eliminate fault current which might be generated in any electrical system or tool during use. One means is to provide ground fault circuit interrupters (**GFCI**'s) in all temporary receptacle outlets rated 120 volt single phase, 15&20 amps. This is essentially a hardware requirement. The **GFCI** continually monitors and compares the amount of current going to an electrical tool or piece of equipment against the amount of current returning along the "grounded neutral". If the differential in current (amount going to the tool vs. amount coming from tool) is more than 5 milliamps, the GF C1 is designed to trip in about 1/40 of a second. The other option is to establish and fully implement an **Assured Equipment Grounding Conductor Program(AEGCP)**. This program relies on daily visual inspections and periodic (three months maximum for temporary cords and cords exposed to damage, six months for fixed cords not exposed) test inspections. Additionally, the AEGCP requires a written description, a competent person to implement the program and a record of the periodic tests.

HAZARDS:

Fatal electrocutions; Electrical burns ranging from critical to minor; Fire; Explosion; Electric shock has been the initiator of other type hazards, i.e. electrical shocks have been the initiating cause of employees falling from elevated work surfaces, electrical shocks have caused employees to lose control of hand held equipment which in turn has struck and injured other employees in the immediate work area, etc.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Instruct employees to visually inspect all electrical equipment prior to use. Any defects such as frayed cords; missing ground prongs, cracked tool casing, etc. should be corrected by taking the tool out-of-service. Apply a warning tag to the tool and do not allow it to be used until the problem has been corrected.
- Frequently trip GFCI's while test tool is operating to insure GFCI is operating correctly.

- Use double insulated tools. Double insulated tools protect the user from fault currents which might energize the case of the tool or equipment.

SELECTED CASE HISTORIES:

A journeyman HVAC worker was installing metal duct work using a double insulated drill connected to a drop light cord. Power was supplied through two extension cords from a nearby residence. The individual's wet clothing/body contacted bare exposed conductors on one of the cords causing an electrocution. No GFCI's were used. Additionally, the ground prongs were missing from the 2 cords.

COMMENTS:

1. Although it was suggested above to use double insulated tools, it does not relieve the employer from providing ground fault protection. Extension cords in use between a fixed electrical system (permanent outlet) and a tool can become worn with exposed energized conductors. Therefore, ground fault protection or an AEGCP would be required. See OSHA CLARIFICATION LETTER below.
2. According to OSHA[10] there were 48 fatalities in the years 1985 to 1989 related to 120 volt electrical systems.
3. Employers have attempted to skirt the requirements of providing ground fault protection by using 30 amp breakers in their 120 volt, single phase systems. This not only defeats the intent of the ground fault provisions it also introduces another set of hazards because the system is no longer rated for the actual over current protection (30 amp breaker) that is in place.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

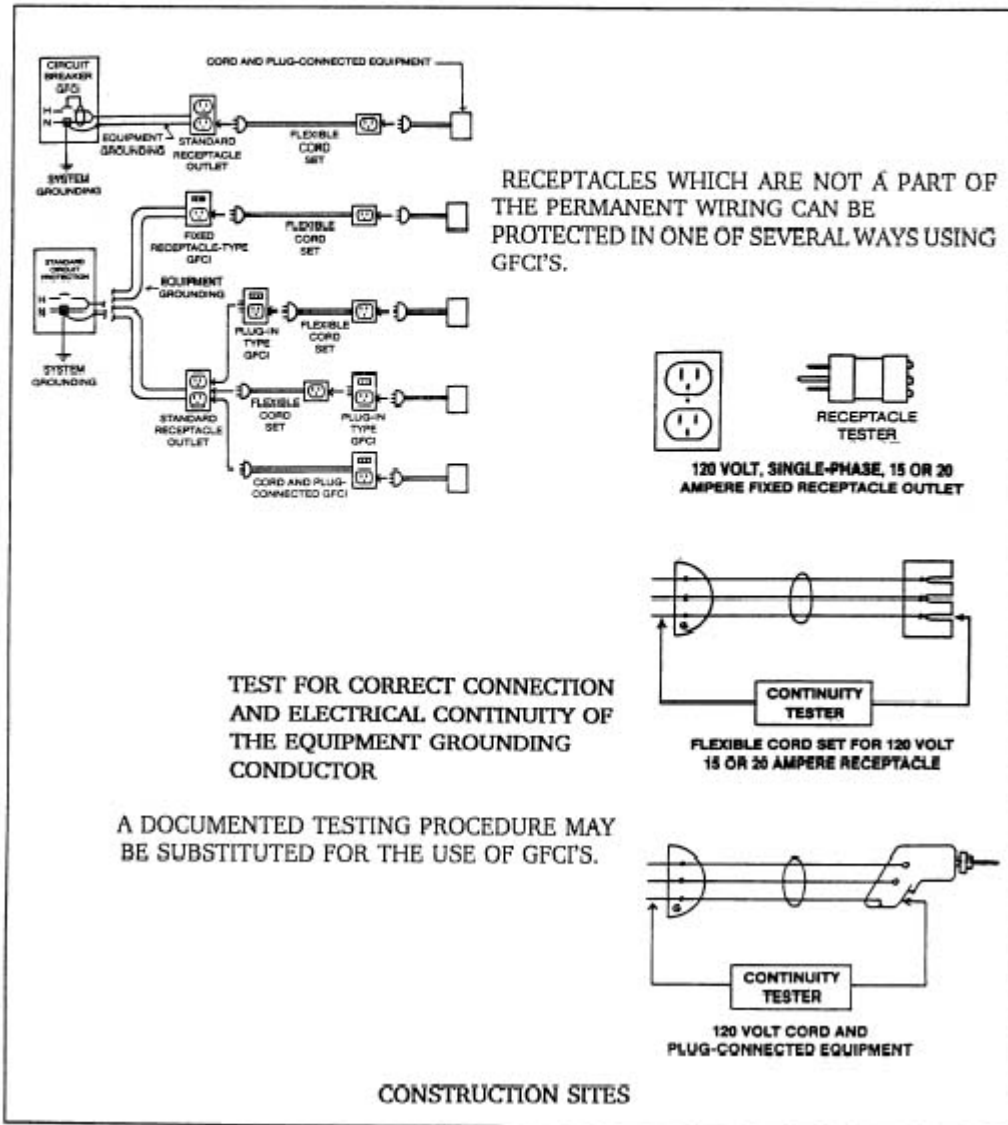
[1] Section 404(b); [3]; [4]; [5]

OSHA CLARIFICATION LETTER

Date 11/4/92; Directorate Compliance Programs to Private Company; Synopsis - If all extension cord sets and/or portable tool assemblies are approved and used in such a manner that the entire lengths of all cords which are provided power from either permanent or temporary wiring are provided with GFCI protection then the employer would be in compliance. If any of the cords or tools in a series are not protected by a GFCI, then an AEGCP would be required for all the cords and tools including the ones which are protected by a GFCI.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS

RECEPTACLES WHICH ARE IN USE BY EMPLOYEES SHALL HAVE GFCI'S FOR PERSONNEL PROTECTION OR THE ASSURED EQUIPMENT GROUNDING PROGRAM⁽³⁾



RANK IN FREQUENCY CITED	1926.	ELECTRICAL PATH TO GROUND MISSING OR DISCONTINUOUS
#4	404(f)(6)	

RULE: *Grounding Path. The path to ground from circuits, equipment, and enclosures shall be permanent and continuous*

INTENT:

Many times on construction sites due to the frequency and severity of use, electrical equipment that is originally designed and provided an electrical path to ground is not capable of physically transferring "fault" current to ground because the positive physical path (a direct positive connection through the entire system

usually terminating at a ground rod or cold water pipe) to ground, sometimes known as the "ground wire" or "equipment ground" is proved to transfer fault current to ground in the event that an exposed part of the piece of equipment were to be energized by the "hot" conductor or wire in the system, i.e. the case of an electric drill might be energized by fault current if the internal windings came in contact with the case or contact is made with an exposed conductor. The "equipment ground" would, in the case of the drill, provide a favorable path of least resistance for the fault current to ground through the conductor. If the "equipment ground" was not continuous the path of least resistance from the drill might be through a persons body.

HAZARDS:

Electrical shock; Probable injuries range from death to minor burns; Fire; Explosion; Electric shock has been the initiator of other Type hazards, i.e. electrical shocks have been the initiating cause of employees falling from elevated work surfaces, WNW shocks have caused employees to lose control of hand held equipment which in turn has struck and injured other employees in the immediate work area, etc.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Instruct employees to visually inspect all electrical equipment prior to use. Any defects such as frayed cords, missing ground prongs, cracked tool casing, etc. should be corrected by taking the tool out-of-service. Apply a warning tag to the tool and do not allow it to be used until the problem has been corrected.
- Frequently inspect electrical systems to insure the path to ground is continuous. A volt-ohm meter rated for the proper capacity could be used to check for ground in an electrical circuit. A receptacle circuit tester can be used to check the continuity of the grounding conductor from a 120 volt receptacle back to its origin at the breaker box. This type tester depending on manufacturer usually has the ability to check for wiring configurations including correct wiring, reversed polarity, open neutral, open hot, etc. Additionally, it is relatively inexpensive- usually less than \$20 dollars and can be easily carried in a pants pocket. A pocket pen light continuity checker is an inexpensive piece of equipment that can be used to check the "equipment bonding" conductor of cord and plug connected equipment, i.e. drills, saws, sanders, etc.
- Use double insulated tools. Double insulated tools protect the user from fault currents which might energize the case of the tool or equipment. If electrical equipment is double insulated it must be distinctively marked.

SELECTED CASE HISTORIES

A fan connected to a 120-volt electrical system via an extension cord provided ventilation for an employee performing a chipping operation from an aluminum step ladder. The insulation on the extension cord was cut through and exposed bare energized conductors which made contact with the ladder. The ground wire was not attached on the male end of the cord's plug. When the energized conductor made contact with the ladder, the path to ground included the employee's body resulting in death.

COMMENTS

1. A large majority (estimated from many compliance staff sources) of the citations under this standard are issued because ground prongs are missing from cord and plug connected equipment or extension cords.
2. Sometimes ground prongs are intentionally removed from tools and extension cords because, "it makes them easier and quicker to plug into and remove." Statements such as these heard from employees clearly indicate that they do not understand the importance of the of the components of the equipment grounding system.
3. For five years, citations were issued to the contractor who employed the deceased employee in 93 fatality/ catastrophe investigations that OSHA conducted, where the absence of a required equipment grounding conductor or lack of continuity of the conductor were listed as a factor.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE

[1] Section 404(f); [2] pg. 5; [3] pgs. 35-58; [4]; [5] Art. 250

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS

IF A FAULT OCCURS, THE CURRENT WILL FOLLOW THE PATH OF LEAST RESISTANCE TO GROUND. IF THE WORKER PROVIDES A PATH TO GROUND AS SHOWN, SOME PORTION OF THE CURRENT WILL FLOW AWAY FROM THE GROUNDED WHITE CONDUCTOR (NEUTRAL), AND RETURN TO THE GROUND THROUGH THE WORKER. THE SEVERITY OF THE SHOCK RECEIVED WILL DEPEND ON THE AMOUNT OF CURRENT THAT FLOWS THROUGH THE WORKER.

CORD AND PLUG CONNECTED EQUIPMENT WITHOUT A GROUNDING CONNECTOR.

VIOLATION IN-COMPLIANCE

DANGEROUS FAULT CURRENT NOW IS REDIRECTED ALONG THE EQUIPMENT GROUNDING CONDUCTOR BACK TO THE SOURCE OF ELECTRICAL SUPPLY TO OPERATE OVERCURRENT DEVICE.

CORD AND PLUG CONNECTED EQUIPMENT WITH A GROUNDING CONNECTOR.

VIOLATION IN-COMPLIANCE

VIOLATION IN-COMPLIANCE

Equipment grounding conductor, i.e. ground prong, missing (arrow).

VIOLATION IN-COMPLIANCE

Ground prong (arrow) in-place and conductor is continuous.

VIOLATION IN-COMPLIANCE

2 conductors (arrow) from non-metallic (NM) sheath cable rigged to multi-receptacle extension cord. No grounding provided. NOTE: Other violations include using NM cable in a manner not prescribed and strain relief was not provided for the other attachment plug shown (see tape at base of plug).

<p>RANK IN FREQUENCY CITED</p> <p>#5</p>	<p>1926.</p> <p>652(a)(1)</p>	<p>PROTECTIVE SYSTEMS FOR TRENCHING/EXCAVATING</p>
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RULE: Each employee in an excavation shall be protected from cave-fns by an adequate protective system designed in accordance with paragraph (b) or (c) of this section.

INTENT:

Excavation accidents often result in serious injury or death. California reports a ratio of lost-time accidents to fatalities [14] for cave-ins aqua to 14:1. In contrast that same ratio for all types industry in California a 250:1.

From 1985-1989 OSHA investigated 239 excavation fatalities [10]. This rule is basically a general rule and its intent is to state that the employer will utilize some means of protection when employees are working in an excavation. This standard requires employers to protect employees from cave-ins. Later paragraphs, Paragraph (b) "Design of Sloping and Benching Systems" and Paragraph (c) "Design of Support System, Shield Systems and Other Protective Systems give specific alternatives and corresponding appendices to help the employer comply with the rule (NOTE: Appendices A - F provide valuable information for complying with the standard). The rule does not cover excavations in stable rock and excavations less the 5 feet deep - ONLY when the competent person evaluates the excavation and states there is no potential for cave-ins.

HAZARDS:

A cave-in is the greatest risk associated with excavation, Fatalities can be expected if a cave-in occurs. Other type hazards which are similar to confined space situations should be expected including asphyxiation due to lack of O₂, inhalation of toxic materials, fire, drowning, etc. Moving machinery near the edge of the excavation can cause a surcharge (overloading) of the excavation wall that can cause collapse. Plus, the same machinery and vehicular traffic can strike employees. Many accidents occur when workers contact or sever underground utility lines.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Pre job planning is vitally important to this operation. The soil must be evaluated so the employer can select an appropriate protective system. Utilities must be contacted so they can identify their underground lines, traffic control may be an issue, an attempt to identify previous site history must be made, in. was the excavation previously backfilled?, etc.
- Construct all protective systems in accordance with the standard.
- Inspect the site daily at the start of each shift, following a rainstorm or after any other hazard increasing event.
- Keep excavations open *the minimum* amount of time needed to complete operations.

SELECTED CASE HISTORIES:

- Two employees were installing 6' PVC pipe in a 40 long x 9t x 2t wide trench. No means of protection was provided in the vertical wall trench. A cave-in occurred fatally injuring one employee and causing serious facial injuries to the second employee.
- An inadequately protected trench wall collapsed killing one employee who had just gotten into the trench to check grade for installation of an 8" sewer line. The trench was = 201-25, deep and had been benched one bucket width (40 on each side. At the time of collapse the backhoe was extracting soil from the trench.
- Four employees were in an excavation 9, wide x 3V long x 71 deep were boring a hole under a road. Eight foot steel plates used as shoring were placed against the side walls of the excavation at about 30 degree angles. No horizontal bracing was used. One of the plates tipped over crushing an employee.

COMMENTS:

1. Of all the excavation standards, this one is cited the most often because it is the appropriate standard to cite when no protection at all is provided. Unfortunately, many employers engaged in this activity, still provide no protection for their employees.
2. This standard is written in a unique manner - "Each employee ", which gives OSHA, the option to cite this particular standard for each exposed employee.
3. 'This standard was cited in 47 fatality/catastrophe inspections conducted by the Agency from March 1990 to January 1992.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[141], [20]

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Properly constructed timber shoring and trench box (left)

NOTE: The plywood (bottom right) is not a structural member of the shoring system. It is to be used only to prevent the soil in the sidewalls from raveling.



VIOLATION IN-COMPLIANCE

Employees in vertical wall trench with no sidewall protection (above).



VIOLATION IN-COMPLIANCE

Improper shoring including including bracing is not secured (above)

VIOLATION IN-COMPLIANCE

Employees is exposed (arrow) between concrete manhole and unprotected sidewall of excavation (right).



RANK IN FREQUENCY CITED	1926.	GUARDRAIL SPECIFICATIONS FOR TUBULAR WELDED FRAME SCAFFOLDS
#6	451(d)(10)	

RULE:

Guardrails made of lumber, not less than 2 x 4 inches (or other material providing equivalent protection), and approximately 42 inches high, with a midrail of 1 x 6 inch lumber (or other material providing equivalent protection), and toeboards, shall be installed at all open sides and ends on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.

INTENT:

OSHA investigated 214 fatalities from 1985-1989 [10] related to falls from scaffolds. The intent of this standard is to provide specifications for a fall prevention system, i.e. standard guardrails and toeboards, on

tubular welded frame scaffolds. Because this is a specification standard it only applies to tubular welded frame type scaffolds. Note: This standard requires both standard guardrails and toeboards at a height of 10'. The general scaffold requirement 1926.451(a)(4) which requires guardrails between 41-10, when the minimum horizontal dimension of the scaffold is < 45', does not include tubular welded frame scaffolds, see **OSHA CLARIFICATION LETTER** below. Other guardrail materials which would provide equivalent protection are listed in TABLE 5.2-1. When persons must work or pass under a tubular welded scaffold, wire mesh construction is required. This includes a minimum No. 18 gauge US. Standard wire ½-inch mesh or equivalent extending along entire opening from toeboard to top rail. If persons are not required to work or pass under the scaffold only a toeboard is necessary (see TABLE 5.2-2 for acceptable toeboard specifications).

HAZARDS:

- Fall from elevation. Probable injuries range from death to severe sprains/strains.
- Struck by falling objects from scaffold platforms with insufficient material containment systems, i.e. wire mesh screen or toeboards. Probable injuries could include death or lost-time injuries (head concussion, broken bones in the upper body areas, etc).

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Whenever employees must work any elevated location, ask: 1) Are they protected from a fall? and 2) What measures must be taken to protect the employee at the elevated work location?
- Fall prevention systems such as standard guardrail systems provide a more positive means of protection than fall protection systems such as the use of a bodybelt/harness-lanyard-lifeline combination.

SELECTED CASE HISTORIES:

- An employee preparing masonry facia for removal from a building fell from the third level of a tubular welded frame scaffold. No guarding system was provided for the scaffold. Further, the platform was coated with ice creating a slippery condition.
- A contract employee was taking measurements inside a reactor vessel from an unguarded tubular welded frame scaffold when he either lost balance or stepped backwards and fell 14 ½', sustaining fatal injuries.

COMMENTS:

1. Many scaffolding guardrail violations are issued because no railings were provided on the ends of the scaffolds. Remember, a fall prevention system is not complete until the scaffolding is completely enclosed. Additionally, this is a specification standard, therefore, it is more easily identified and substantiated as a violation when the guarding is not provided.
2. Scaffold cross-bracing (X braces) are not acceptable alternatives for guardrails.
3. Many times scaffold guardrail are provided for tubular welded frame scaffolds where only one or two 10" planks are provided for a 60" wide scaffold end frame. This is ineffective because there is a potential for an opening 40"-50" between the edge of the "platform" and the guardrail (if in-place). Instead of falling over the edge of the scaffold, employees are exposed to falling through the scaffold.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 451(a) & (d), [17]

OSHA DIRECTIVE #100-58 (STD 3-10.3)

Date 10/30/78-Synopsis - Wire, chains, synthetic and fiber apes may be used as guardrails as per equivalent requirements of 1926.451 (a) (5) provided it meets the following guidelines: 1) it is secured to each support and **taut at all times**; 2) it is free of sharp edges; and 3) it has a maximum deflection of 3" in any direction when a 200 lb. load is applied.

Note: No size requirements of the ropes are listed in directive.

OSHA CLARIFICATION LETTER

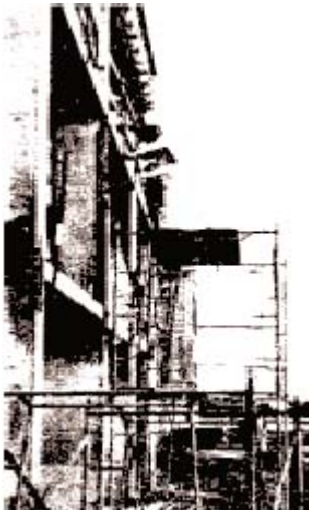
Date 3/11/83; From Acting Regional Administrator Region III to Area Director; Synopsis 1926.451(a)(4) General Scaffold Requirements, guarding in particular If a specific type scaffold is covered by a standard

such as tubular welded frame guarding doesn't need to be provided as per 451(a)(4) from the 4' 10' level unless adjacent to dangerous equipment. NOTE: This position was reaffirmed in a letter dated August 7, 1992 from the Acting Assistant Secretary to an individual company.

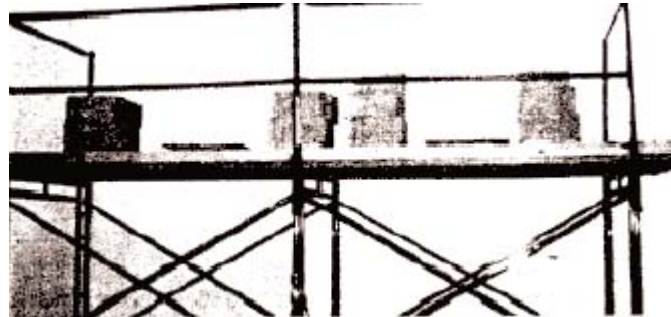
PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



End frame not guarded.
NOTE: The hole between the scaffold planks is large enough to fall through (left).



12 1/2 ft. tall scaffold (left) with no fall protection provided.



VIOLATION IN-COMPLIANCE

A properly erected guardrail system with top rail, mid rail and toeboard.



VIOLATION IN-COMPLIANCE

(above left, left, immediately above)

4 buck high scaffold (above) with no guardrail system any of the 4 working heights.

NOTE: The incomplete platforms and deficient erection of the structural members.

RANK IN FREQUENCY CITED	1926.	APPROPRIATE PPE USED FOR SPECIFIC OPERATION
#7	28(a)	

RULE:

The employer is responsible for requiring the wearing of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions or where this part indicates the need for using such equipment to reduce the hazards to the employees.

INTENT:

This rule gives the **employer** responsibility for insuring that employees wear appropriate PPE to reduce the exposure to hazardous conditions such as falling objects, toxic atmospheres, noise exposure, etc **PPE is not only a right for the employee - it is a responsibility for the employer.** This standard is part of Subpart C - General Safety and Health Provisions. Specific PPE and life saving equipment requirements are found in Subpart E, including: head protection; hearing protection; eye and face protection; respiratory protection; safety belts, lifelines, and lanyards; and safety nets. The Subpart E requirements are usually more specific than the Subpart C requirement. 1926.28(a), therefore, the standards in Subpart E are utilized more often than 1926.28(a). For example 1926.100(a) is #2 on the 100 **Most Cited Physical** LIST, conversely 1926.28(a) is #7. The Subpart E standards give specifications/guidance for selecting, use and maintenance of appropriate types and levels of PPE depending on the types of hazards employees are exposed.

HAZARDS:

Hazards can range from falling objects or bodies to inhalation of toxic materials. The injuries related to this standard also vary widely, including instant death from the inhalation of a highly toxic substance to a minor burn.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Evaluate the operations, define the hazards. When it is not feasible to design out all hazards, it may be necessary for employees to wear PPE.
- Discipline workers who fail to wear PPE. Because PPE can be uncomfortable, cumbersome, hot etc., employees sometimes don't wear it even though they know they may be risking injury. When an employee has been given repeated warnings about not wearing PPE, but still does not wear it, it may be prudent for the employer to impose appropriate penalties, leading to release if the employee persistently chooses not to follow company safety rules.
- Another system that has shown to work is to require employees, as a condition of employment, wear PPE at all needed times.

SELECTED CASE HISTORIES:

An employee was working with a crew setting a metal elbow duct for a bag house when he fell 50' to his death. The victim was wearing a safety belt with lanyard; however, the lanyard was not attached to any tie-off support.

COMMENTS:

1. Several United States Courts of Appeals have vacated citations relying on this standard as a requirement for fall protection. However, as can be seen by the numerous violations related to the standard the Agency was still enforcing it in 1991. In response to the courts, OSHA developed guidelines to use 1926.28(a) & 1926.105 for fall protection. Those guidelines were set forth in STD 3-3.1. See below for a synopsis of that STD. However, STD 3-3.1 has been canceled and is no longer in effect, See **OSHA NOTICE CPL 2** below.
2. This standard was cited in 257 fatal/catastrophe inspections in 5 years by the Agency.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Sections 1926. 100, 101, 102, 103, 104, 105 & 106; [7]*, [8]*, [9], [12], [13], [15]*, [16]; [25] *- Referenced in 29 CFR 1926- Construction Standards

OSHA. INSTRUCTION STD 3-3.1

Date 7/18/83; Synopsis - Clarifies using 1926.28(a) & 1926.105(a) as fall protection requirements. Gives guidance as to how to apply the standards. General guidance is to provide safety belts-lanyards at heights > 10' and < 25'. Above 25' provide safety new or other means of adequate fall protection. Other specific guidance is provided. Note - this STD has been canceled. OSHA Notice CPL 2 is currently in effect, see next page.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS

OSHA Notice CPL 2

October 5, 1992

Office of Construction and Maritime Compliance Assistance

Subject: Cancellation of OSHA Instruction STD 3-3.1

- A. Purpose notice cancels an OSHA Instruction based on court decisions that make the guidance given in the instruction inaccurate.
- B. Scope. This notice applies OSHA-wide.
- C. Cancellation. OSHA Instruction STD 3-3.1, July 18, 1983, "Fall Protection in Construction: 29 CFR 1926.28(a) and 29 CFR 1926.105(a)," is canceled.
- D. Expiration Date. This notice expires on October 30, 1992.
- E. Action. Users of the OSHA Directives System shall remove from their files and discard OSHA Instruction STD 3-3.1.
- F. Background. The Review Commission has held in the LE. Meyers Company case, OSHRC Docket No. 82-1137, that the December 1972 revision to 1926.28(a) was invalid on the grounds that the change from "and" to "or" was substantive change that could not be accomplished without notice and comment rulemaking. This decision holds that 29 CFR 1926.28(a) may not be cited unless there is exposure to a hazardous condition and the need for personal protective equipment is indicated elsewhere in the Part 1926/1910 Construction Industry Safety and Health Standards.

In view of this decision, use of 1926.28(a) is superfluous. If a hazard is addressed by another standard, such as 1926.105 for a fall greater than 25 feet, the other standard should be cited. Recognized failing hazards not covered by an existing standard shall be cited in appropriate cases under the general duty clause as indicated in Chapter N of the Field Operations Manual.

Directorate of Compliance Programs

NOTE:

Even though the use of this standard has been curtailed. It is strongly recommended by OSHA that the employer evaluate all operations employees are involved with at a worksite to determine what hazards might exist and the appropriate measures including PPE which can be utilized to eliminate or control the hazard. All other PPE requirements specifically addressed by OSHA as well as industry recognized requirements for wearing PPE are still being enforced by the Agency by utilizing specific standards or the General Duty Clause - 5(a)(1).

RANK IN FREQUENCY CITED	1926.	STAIR RAILS REQUIRED AT 30"
#8	1052(c)(1)	CHANGE OF ELEVATION OR 4
		RISERS

RULE: *Stairways having four or more risers or rising more than 30 inches (76 cm), whichever is less, shall be equipped with at least one handrail and one stairrail system along each unprotected side or edge. However, when the top edge of a stairrail system also serves as a handrail, paragraph (c)(7).*

INTENT:

OSHA estimates that 4 fatalities, 5400 impact injuries and 1900 sprain/strain injuries occur annually on

stairways [18]. About 65% of those injured required medical treatment. The intent of this standard is to require the use of stairrail systems and handrails when a set of stairs is > 30" in height or it has 4 risers and an unprotected edge. Walls or stairrail systems (vertical barrier consisting of a handrail, mid rails and constructed similarly to guardrail systems [See TABLE 5.2-1]) can guard an unprotected edge. Note: the top edge of a stairrail system can serve as a handrail. The top edge of the stairrail system which is used as a handrail shall be < 37"-36" > from the surface of the tread measured in line with the face of the riser.

HAZARDS:

Fall from elevation; can be fatal. Most likely injuries range from broken bones to sprains/strains.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Identify all access points where there is a break in elevation of 19". Are all these access points provided a stairway/ladder? Does every access/egress area have a stairway/ladder or some other equivalent safe means of access/egress? Are the stairways constructed/maintained properly?

SELECTED CASE HISTORIES:

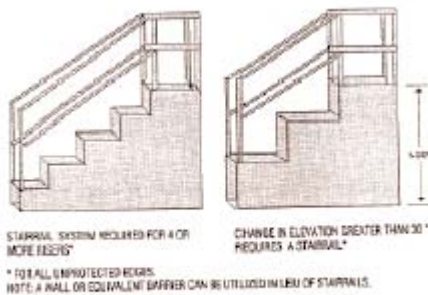
The OSHA IMIS system included no fatalities directly caused by failing to adhere to this standard (since January 1991 when standard came into effect).

- This is another of the more common situations found on construction sites which are covered by specification standards that are easily identified and substantiated as a violation. This is probably a reason it is quite high on the list.
- This standard became effective in January 1991. The old previous standard (1926.500(e)(1)(iii)) ranked #80 on the 1991 List of the Most Frequently Cited Physical Hazards. The two standards taken together would rank #7 on the 100 **Most Cited Physical** L List and #13 on the 100 **Most Cited** List.
- One of the most common stairway violations found on a construction site is the complete absence of stairs or no stairrails for the risers leading into the equipment trailer [Conversations with CSHO's].

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[18], [19]

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Stairrail systems which meet OSHA erection specifications.



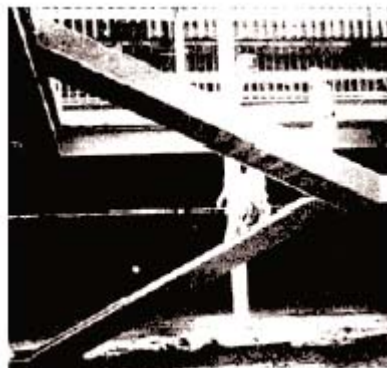
VIOLATION
 IN-COMPLIANCE

No guarding provided for a 6 riser stairway.



VIOLATION IN-COMPLIANCE

Properly erected stairway and stairrail system.



VIOLATION IN-COMPLIANCE

Guarding not provided for the unprotected edge

RANK IN FREQUENCY CITED	1926.	APPROVED CONTAINERS OR TANKS FOR STORING OR HANDLING FLAMMABLE OR COMBUSTIBLE LIQUIDS
#9	152(a)(1)	

RULE: *Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.*

INTENT:

The intent is to provide acceptable containers (Approved safety cans) for the handling, use and storage of flammable and combustible liquids. Because these materials can ignite and cause fires or explosions this standard requires an "Approved Metal Safety Can". The approved safety can may have a maximum five gallon capacity and must include a spring closing lid and spout a flame arrestor, and a design to relieve internal pressure in a safe manner when exposed to fire. "Approved" means equipment that has been listed or approved by a nationally recognized testing laboratory. The standard does not apply to highly viscid materials in their original shipping containers nor to any flammable or combustible liquids in quantities 1 gallon in their original containers or in approved metal safety cans. OSHA now recognizes approved plastic containers, see discussions below.

HAZARDS:

Fire and/or explosion; acute likely injuries range from fatalities to 1st degree burns.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- When handling, storing or using flammable and combustible materials, follow all fire prevention rules such as no smoking. Bond and ground all containers when transferring contents to eliminate the possibility of static charge and a potential ignition source.
- Survey your worksite to determine if flammable and combustibles are being used. Then determine if they are being used, transferred, and stored in a safe manner as prescribed by OSHA and NFPA.

SELECTED CASE HISTORIES:

There were no fatality/catastrophes listed in BUS for the past five years directly tied to violations of this standard. However, the inadequate use, transfer and storage of these materials has caused many serious burns.

COMMENTS:

1. Frequently gasoline I brought on site in a 2½ or 5-gallon unapproved can that was purchased at a local hardware store. Because this is a specification standard the violation is very easy to identify and substantiate (conversations with OSHA CSHOs).
2. Plastic containers can be used as an "approved" container if they have been "approved" by a nationally recognized testing laboratory. See below.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Subpart F

OSHA COMPLIANCE MEMORANDUM

Dates 7/19/89; From Directorate of Compliance Programs to Regional Administrator VI; Synopsis- Clarification stating that the term "approved" applies to the use of plastic containers in lieu of metal safety cans when they are approved as containers for flammable liquids over one gallon by Underwriters Laboratories (UL) or Factory Mutual (FM) (or other nationally recognized testing laboratory).

OSHA ISTRUCTION STD 3-4.1A

Date 9/16/80; From OSHA Compliance Programming; Synopses- 1926.155(l) requires a flash arrestor screen for an approved metal safety can. FM requires flame arrestor screens in their approvals of safety cans; however, UL does not require the arrestor screens in their safety can approval. NFPA 30 recognizes approval of both FM or UL. Therefore, any citation issued under this standard for lack of the flame arrestor screen only is de minimis.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS

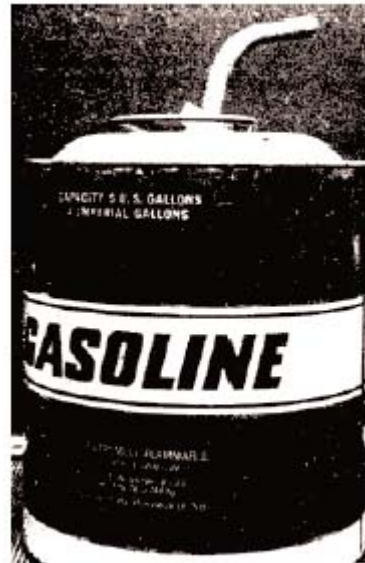


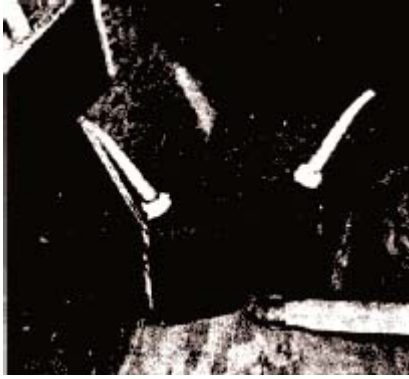
VIOLATION IN-COMPLIANCE

An approved safety can. The arrows show the self closing cover and flame arrestor

VIOLATION IN-COMPLIANCE

A common can on the market for gasoline. However, the can is not approved because it does not include a self-closing top.





VIOLATION IN-COMPLIANCE

2 plastic cans which do not meet the criteria for self-closing tops.

RANK IN FREQUENCY CITED	1926.	GENERAL HOUSEKEEPING
#10	#10 25(a)	

RULE: *During the course of construction, alteration, or repairs, form and scrap lumber with protruding nails, and all other debris, shall be kept cleared from work areas, passageways, and stairs, in and around buildings or other structures.*

INTENT:

Since construction sites are dynamic by nature, the work areas often times become cluttered and disorderly creating a hazard. The array of construction debris is almost endless, including wood from old forms, broken pallets, boards with protruding nails and material shipping container to name just a few. At any given time it would not be unexpected to find any area of a construction site with a housekeeping problem. Housekeeping must be on-going as the job progresses.

HAZARDS:

Poor housekeeping can lead to the increased risk of trips, slips and falls. Resulting injuries range from fractures to sprains/strains.

Associated hazards include nails in boards responsible for skin punctures resulting in lockjaw. If combustibles are not controlled at the site fires may occur.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Encourage the first line managers to make a concentrated effort to focus on housekeeping.
- On larger job sites, give laborers specific duties related to housekeeping only.
- On smaller sites, set up a system designating certain employees on an hourly basis to care for housekeeping chores.

SELECTED CASE HISTORIES:

IMIS did not contain any fatality/catastrophe inspections over the past five years, where violations of this standard were a direct/indirect cause(s) of an accident.

COMMENTS:

1. Although identifying a housekeeping violation is a subjective call (no real specific criteria which delineate what an actual housekeeping hazard is) these violations are rarely challenged when the CSHO has a photograph of the particular situation (Conversations with OSHA Area Directors).
2. This standard was cited in 33 OSHA fatality/catastrophe inspections in five years.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 25 (b) & (c)

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS

VIOLATION IN-COMPLIANCE

All six worksites below are examples of poor housekeeping.



<p>RANK IN FREQUENCY CITED</p> <p>#11</p>	<p>1926.</p> <p>651(k)(1)</p>	<p>DAILY INSPECTION OF PHYSICAL COMPONENTS OF TRENCH AND PROTECTION SYSTEM</p>
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RULE: *Daily Inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.*

INTENT:

This rule gives criteria for employees to use in conducting inspections of excavations to identify signs warning of potential cave-in, failure of a protective system, hazardous atmosphere or other hazards. The criteria include the frequency of inspections (daily prior to each shift, throughout shift as needed, after rainstorms or other hazard-increasing occurrence) and the locations of the inspections (excavations, adjacent

areas and protective systems). The competent person is responsible for conducting these inspections. The competent person must have specific training in, and be knowledgeable about soil analysis, the use of protective systems and the requirements of the standard. An important provision of the competent person requirement is that he/she must have real authorization to take prompt corrective measures to eliminate hazards.

HAZARDS:

Cave-ins are the most frequent and most dangerous hazard associated with these excavations. Fatalities can be expected if a cave-in occurs. Other type hazards similar to those associated with confined spaces should be expected including asphyxiation due to lack of O₂ inhalation of toxic materials, fire, drowning, etc. Moving machinery near the edge of the excavation can cause a surcharge (overloading) with resulting stress cracks at/near the edge of the excavation wall which can cause collapse. Many accidents occur when employees contact or sever underground utility lines.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Use the GUIDE FOR THE DAILY INSPECTION OF TRENCHES/EXCAVATIONS on the next page to assist in identifying the warning signs of excavation failure and specific items to evaluate for different trench/excavation protection systems.
- Keep excavations open the minimum amount of time needed.
- RECOMMENDATION ONLY: Prior to giving authorization as competent person conduct a rigorous testing program to assure that his/her knowledge level is functional for the duties and responsibilities of a competent person.

SELECTED CASE HISTORIES:

- An employee was in a 7' 6" deep trench installing forms for concrete footers when the trench caved-in causing fatal injuries. The trench was in loose sandy soil (Type C) and no inspection was conducted prior to the start of the shift/operation.
- An employee in a trench 6' deep x 32' wide was applying a waterproofing primer material containing methyl chloroform and 1,4 dioxane to the foundation of a house. The employee was overcome and latter died of trichloroethane intoxication. Deficiencies rated to the cause of the accident included: 1) no one had tested the atmosphere in the trench; 2) the employees were not provided with respiratory protection; and 3) mechanical ventilation was not used.

COMMENTS:

1. The competent person must be knowledgeable and have the authority to take corrective action.
2. At times the production schedule and the duties of the competent persons conflict, If the competent person's authority, is overridden, overtly or he/she fails to act because he/she believes the company would not support him/her, then in reality there is no true competent person at the excavation site.
3. This standard was cited in 37 fatality inspections conducted by OSHA since March 1990.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[14], [20]

OSHA CLARIFICATION LETTER

8/5/92; From Directorate of Compliance Programs to Private Company, Synopsis - A competent person need not present at the site at all times when trenching/excavating operations are being conducted. However, it is the competent person's responsibility to inspect the site to identify hazardous conditions and to take the appropriate corrective action. Therefore, the individual conditions at each site will govern the amount of time a competent person must spend at the site.

GUIDE FOR THE DAILY INSPECTION OF TRENCHES AND EXCAVATIONS^[30]

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS.

GUIDE FOR THE DAILY INSPECTION OF TRENCHES AND EXCAVATIONS

WARNING SIGNS OF THE FUTURE

- Tension Cracks (In Sidewalls, Slopes and Surface)
- Ground Settlement or Subsidence
- Changes in Wall Slope or Bulge
- Increase in Strut Loads
- Bowing of Struts
- Spalling or Sloughing of Soils
- Excessive Seepage and Piping of Fine Soils
- Softening of Sidewalls
- Boiling of Trench Bottom
- Creaking or Popping Sounds
- Visual Deformation of Bracing System or Trench

SHORING/BRACING CHECKLIST

- Strict Adherence to Plans and Specifications adjacent to Excavation
- Changes in Soil Condition
- Maintenance of Proper Slope Ratio
- Excessive Vibrations
- Location of Spoil Pile
- Equipment Location Relative to Excavation
- Secondary Soil/Rock Structure
- Presence of Water Seepage and Rainfall
- Location of Trees, Boulders, Structures and Existing Utilities
- Right-of-Way
- Signs of Distress

SLOPING/BENCING CHECKLIST

- Strict Adherence to Plans and Specifications
- Changes in Soil Conditions
- Excessive Vibration
- Location of Spoil Pile
- Equipment Location Relative to Excavation
- Excessive Wear or Damage to Equipment
- Signs of Distress
- Improper Use of Shield Workers in unshielded trench
- Improper Installation Procedures
 - Workers in unbraced trench
 - Improper system being used
 - Improper alignment of members
 - Improper installation of connections
- Location of Existing Utilities and Backfill

TRENCH SHIELD (BOX) CHECKLIST

- Strict Adherence to Plans and Specifications
- Changes in Soil Conditions
- Clearance Between Shield Trench Sidewalls
- Adequate Freeboard at Top of Shield
- Proper Slope Above Shield
- Current Certification of Shield
- Excessive Wear or Damage of Shield
- Improper Use of Shield
 - Workers in unshielded trench
 - Improper shield being used
- Location of Existing Utilities

NOTE:

These are only general warnings of failure and recommendations for daily inspections of most trenches and excavations. Every trench/excavation must be inspected by a competent person as per 1926.651(k)(l) for the items listed above and all other hazards which are unique to that site.

RANK IN FREQUENCY CITED	1926.	SAFE ACCESS FOR ALL TYPES OF SCAFFOLDS
#12	451(a)(13)	

RULE: *An access ladder or equivalent safe access shall be provided*

INTENT: To decrease the risk of a fall, this standard requires a ladder or other equivalent means of access for scaffolds. Too often when ladders are not in place, workers climb the end frames of the scaffold (a common unsafe work practice in the construction industry). This can be hazardous. Depending on the design of the end frame the structural members which are used as ladders rungs can be narrower than the width of

an average foot i.e. this case requires the employee to actually stand on the side of his foot on the "rung"
The vertical distance between "rungs" also may be excessive (2 ½" - 3'), resulting in the employee reaching for the next "rung". Unless the end frame is designed as a ladder access frame, it must not be used as such. The scaffold manufacturer or dealer can assist the user in determining if a scaffold frame has a built-in ladder. Some of the common frames do not have built-in ladders. Scaffold ladders that attach directly to the frame can be obtained from scaffold dealers. Equivalent safe access to scaffold platforms can include access from a building floor/window directly to the platform, a portable stairway system, etc.

HAZARDS:

Fall from elevation. Probable injuries vary from death to severe sprains/strains.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Construct all scaffolds and related components (ladder access) as per scaffold manufacturers technical literature.
- Whenever possible, use a window/floor at the elevation of the platform to gain access, thereby, eliminating any hazard associated with climbing.

SELECTED CASE HISTORIES:

While descending the end frame of a scaffold that was not designed to be a built-in ladder, an employee lost his balance, fell 13' to concrete and suffered fatal head injuries.

COMMENTS:

- 1 If the scaffold user has any questions about the scaffold, i.e. construction, use, etc. they should contact the scaffold manufacturer or dealer. Experience has proven that they are fully cooperative and can assist with technical questions.
2. If workers use an attached ladder on the end frame of the scaffold, the scaffold must be constructed to withstand the effects of the overturning force imparted on the scaffold due to the external loading caused by the weight of the person climbing the ladder. A material hoist on the same side as the ladder might increase the overturning force causing collapse of the scaffold. These loading factors must be considered in the design/construction phase.
3. A portable ladder, constructed and used as per Subpart X of 1926 is an acceptable ladder for access to scaffolding.
4. This standard was cited in 35 fatality inspections conducted by OSHA over five years.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 451; [18] Sections 1051 & 1053-1060 (Subpart X)

OSHA COMPLIANCE LETTER

Date 2/25/83; From Chief, Division of Compliance Prgms., to Individual Company; Synopsis - 1) It's not practical for employer to provide ladder access at all times for employees assembling/disassembling scaffolding; however, other safe access must be provided; 2) end frames designed by a scaffold manufacturer as ladder access are acceptable if they are erected in a continuous line and the maximum spacing between rungs < 16½"; 3) portable wood or metal ladders must comply with Subpart X (formerly Subpart L); 4) fixed ladder standards do not apply to scaffolds; and 5) Subpart X does not apply to built-in scaffold ladders.

OSHA CLARIFICATION LETTER

Date 4/7/87; From Director of Directorate of Field Programs to Regional Administrator; Synopsis - The following relate to designed and manufactured built-in scaffold access ladders: 1) allow a maximum 16½ " rung spacing; 2) rungs may be spaced unevenly where end frames join provided they do not exceed maximum rung spacing; 3) climbing over top guardrail or scaffold board overlay is not a safe practice; and 4) guardrail systems shall be provided with removable rails, chains or gates in accordance with manufacturers' recommendations.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

The 2 photos (left) show employees accessing scaffolds by using a hook-on scaffold. NOTE: the inward swinging gate which allows employees to step directly from the ladder on to the platform. Also, the scaffold (far left) has a platform which is not fully planked and creates a hazard.



VIOLATION IN-COMPLIANCE

The 2 photos (above & left) show employees using the structural members of end frames as ladders. The scaffold manufacturer did not design these type end frames as built-in ladders. NOTE: The platform violations

VIOLATION IN-COMPLIANCE

The scaffold below shows end frames which were designed by the manufacturer to be built-in ladders. NOTE: The chain above the platform guarding opening.



RANK IN FREQUENCY CITED	1926.	GROUND FAULT CIRCUIT INTERRUPTERS (GFCI's)
#13	404(b)(1)(ii)	

RULE: *All 120-volt, single-phase, 15-and-20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit Interrupters for personnel protection. Receptacles on a two-wire, single-phase portable or vehicle-mounted generator rated not more than 5kw, where the circuit conductors of the generator are Insulated from the generator frame and all other grounded surfaces, need not be protected with ground-fault circuit Interrupters.*

INTENT:

This standard requires the use of electrical hardware that is designed for monitoring ground fault current and is capable of stopping the fault current in the circuit, i.e. through an employee's body. This rule states that all 120 volt 15 & 20 amp receptacles outlets on construction sites will be protected by ground fault circuit interrupters (GFCI's), when not part of the permanent wiring of a structure. Because a receptacle is in effect part of the branch circuit wiring, this rule is effectively identical to 1926.404(b)(1)(1) - GROUND FAULT PROTECTION. For more information related to the operation of GFCI's see #3 **GUIDE** Sheet. This rule exempts portable or vehicle-mounted generators that meet the following: 1) rated < 5kW; 2) system wiring is

two wire, single phase; and 3) circuit conductors are insulated from the generator frame and all other grounded surfaces. **NOTE: GFCPS ARE NOT TO BE USED IN LIEU OF EQUIPMENT GROUNDING - GFCPS ARE SUPPLEMENTAL PROTECTION AND MUST ONLY BE CONSIDERED AS A BACKUP TO EQUIPMENT GROUNDING.** GFCI's can be placed anywhere in the circuit and still be effective. They may be put in a panel box as a breaker, at the receptacle or in-line anywhere along an extension cord up to the tool. GFCI's are very important on construction sites because of the likely probability of encountering wet/damp locations that greatly increase the risk of electrical shock.

HAZARDS:

Fatal electrocutions, electrical burns ranging from critical to minor, Fire; Explosion; Electric shock has been initiator of other type

hazards, i.e. electrical shocks can cause employees to fall from elevated work surfaces, loose control hand held equipment which in turn

can strike other employees in the immediate work area, etc.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Frequently trip GFCI's while test tool is operating to insure GFCI is operating correctly.
- Use double insulated tools. Double insulated tools can protect the user from fault currents which might energize the case of the tool or equipment.
- GFCI's for 220-volt circuits are available. Note: they are not required by this standard.

SELECTED CASE HISTORIES:

An employee attempted to plug an extension cord into a temporary power spider box. The employee was kneeling on the ground and held the box in his hand. Fault current energized the case of the box and electrocuted the employee. No GFCI's were used.

COMMENTS:

1. Although double insulated tools are recommended, using them does not relieve the employer from providing ground fault protection. Extension cords connecting a fixed electrical system (permanent outlet) and a tool can become worn with exposed energized conductors. Therefore, ground fault protection or an AEGCP would be required. See OSHA CLARIFICATION LETTER below.
2. According to OSHA [10] there were 48 fatalities in the years 1985 to 1989 related to 120-volt electrical systems.
3. Employers have attempted to skirt the requirements of providing ground fault protection by using 30 amp breakers in their 120-volt, single-phase systems. This not only defeats the intent of the ground fault provisions, it also introduces new hazards because the system is no longer rated for the actual over current protection (30 amp breaker) that is in place. (Personal experience & conversations with CSHO's).
4. Had all 3 requirements for ground fault protection been combined (1926.404(b)(1)(i) & (ii) & (iii)), they would have been ranked # 1 on the 100 **Most Cited Physical List a** and #4 on the 100 **Most Cited LIST**.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 404(b); [3]; [4]; [5]

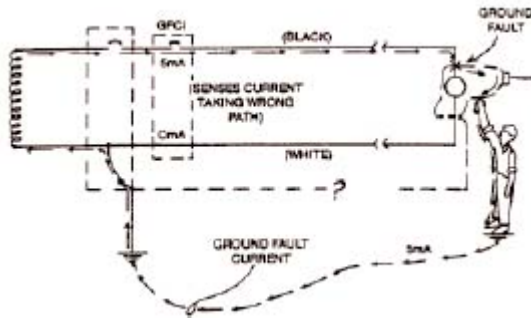
OSHA CLARIFICATION LETTER

Date 11/4/92; Directorate Compliance Programs to Private Company; Synopsis - If all extension cord sets and/or portable tool assemblies are approved and used in such a manner that the entire lengths of all cords whether provided power from either permanent or temporary wiring, have GFCI protection, then the employer would be in compliance. If any of the cords or tools in a series are not protected by a GFCI, then an AEGCP would be required for all the cords and tools, including the ones already protected by a GFCI.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS

The Ground-Fault-Circuit Interrupter ("GFCI") provides an additional precaution

The GFCI is a solid-state, sensitive device which can be applied to open the circuit in case of ground-fault leakage too small to trip the circuit breaker, (but large enough to be dangerous to people).



HOW THE GFCI PROTECTS PEOPLE

(BY OPENING THE CIRCUIT WHEN CURRENT FLOWS THRU A GROUND-FAULT PATH.)

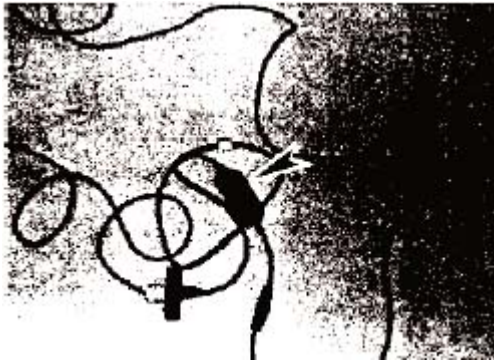
Note that the GFCI will open the circuit if 5 mA or more of current returns to the service entrance by any path other than the intended white wire. If the equipment grounding conductor is properly installed and maintained this will happen as **soon as the faulty tool is plugged in**. If by change this grounding conductor is not intact and low-impedance, the GFCI may not trip out **until a person provides the path**. In this case the person will receive a shock, but the GFCI should trip out so quickly that the shock will not be harmful.

Where are GFCI's required?

OSHA required GFCI's on **construction sites** because of the combined special hazards of two conditions.

- Questionable integrity of the ground-fault path through **temporary wiring**.
- Presence of **wetness** due to working on earth, wet concrete, etc.

VIOLATION IN-COMPLIANCE



The use of portable GFCI's (arrow) meets this requirements.

RANK IN FREQUENCY CITED	1926.	GUARDING OF PROTRUDING STEEL REBARS
#14	701(b)	

RULE: Reinforcing steel. All protruding reinforcing steel, onto and into which employees could fall, should be guarded to eliminate the hazard of impalement.

INTENT:

In conversations with construction personnel, they seem to all have an account of a situation where an employee has fallen and Impaled himself on a piece of steel rebar. The accounts are some of the most gruesome stories told related to accidents in the construction industry. This rule requires guarding for the ends of the rebar where the potential impalement could exist. The most common guarding is specially

manufactured rebar caps which fit onto the rebar and have rounded surfaces facing upward, or lumber is used and set on top of the rebar. The theory is to dissipate the force of the fall by distributing it over a larger area than the diameter of the rebar, i.e. less force reduces tile chance of impalement.

HAZARDS:

Impalement/puncture. Probable injuries can range from death to serious internal injuries.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Prior to installing rebar at the site, insure enough rebar caps or materials to construct caps will be available.

SELECTED CASE HISTORIES:

- An employee pulling a concrete hose along a form fell 2 stories and hit his head on steel bars which punctured his brain.
- A laborer fell through a roof opening about 8' to a patio foundation that had about 20 half-inch rebar protruding straight up. The laborer was impaled by one of the bars and died.

COMMENTS:

1. This is another example of a specification standard which is easy to identify and substantiate (its either in-place or its not) as a violation.

Even though exposed vertical rebar would not be present at many OSHA construction inspections, this situation is being cited very frequently as evident by its #14 ranking on the Most Cited Physical Hazard List. This might be an indicator of industry wide noncompliance.

2. This standard was cited in 12 fatality investigations.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Subpart Q, [26]; [27]

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Rebar caps which are acceptable as meeting OSHA requirements.



VIOLATION IN-COMPLIANCE

The arrows show 3 rebars without protective caps which create a hazard.

RANK IN FREQUENCY CITED	1926.	GENERAL REQUIREMENTS FOR
#15	451(a)(4)	GUARDING SCAFFOLDS

RULE:

Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 10 feet above the ground or floor, except needle beam scaffolds (See paragraphs (p) and (w) of this section). Scaffolds 4 feet to 10 feet in height, having a minimum horizontal dimensions in either direction of less than 45 Inches, shall have standard guardrails installed on all open sides and ends of the platform.

INTENT:

This standard specifies when guardrail systems and toeboards are required for all types of scaffolds (General Scaffold Requirements) that are not covered by a specific standard. The requirements for guardrails at specific heights is similar to 1926.451(d)(10). Tubular Welded Frame Scaffolds (See #6 "Most Cited Physical Standards Sheet"), except for scaffolds which are 4' to 10' in height which are not covered by a specific standard. For further explanation see **OSHA CLARIFICATION**

LETTER date 8/7/92, below. Guardrail and toeboard construction specifications are contained in 1926.445 (a)(5) & (6). This rule contains an exemption for needle beam scaffolds and floats (suspended scaffolds) and directs compliance with those type scaffolds be in accordance with Paragraphs (p) & (w), respectively. Guardrail systems are not required on these type scaffolds, OSHA requires only safety-belts and lifelines in accordance with 1926.104 for needle beam and float scaffolds.

HAZARDS:

- Fall from elevation. Probable injuries range -from death to severe sprains/strains.
- Struck by falling objects from scaffold platform due to lack of/insufficient material containment system, i.e., wire mesh screen or toeboards. Probable injuries include death, lost-time injuries due to head concussion, broken bones in the upper body, etc.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Whenever an employee must work at **any** elevated location ask the questions: 1) Are they protected from a fall? and 2) What measures must be taken to protect the employee at the elevated work location?
- Fall prevention systems such as standard guardrail systems provide more positive means of protection than fall protection systems such as a bodybelt/harness-lanyard-lifeline combination, except when workers are suspended, i.e., from suspended scaffolds, work platforms, etc.
- Construct/maintain all guardrail system according to OSHA requirements.

SELECTED CASE HISTORIES:

An employee was installing overhead boards from a scaffold platform consisting of two 2"x10" boards with no guardrails. He lost his balance and fell 7'6" to the floor sustaining fatal injuries.

COMMENTS:

1. Many scaffolding guardrail violations are issued because no railings were provided on the ends of the scaffolds. The fall prevention system is not complete until it is completely enclosed. Additionally, because there is a specification standard it is more easily identified and substantiated as a violation when guarding is not provided.
2. This standard was cited in 56 fatality investigations over a five year period.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 451(a) & (d), [17]

OSHA CLARIFICATION LETTER

Date 3/11/83; From Acting Regional Administrator Region III to Area Director; Synopsis - 1926.451(a)(4) - General Scaffold Requirements, guarding in particular - If a specific type scaffold is covered by a individual standard, such as tubular welded frame, Guarding doesn't need to be provided as per 451(a)(4) from the 4' 10'

level unless adjacent to dangerous equipment.

OSHA CLARIFICATION LETTER

Date 8/7/92; From - Acting Assistant Secretary to individual company; Synopsis - The interpretation listed above is correct and still in effect. General requirements for scaffolds, 451(a), apply to all scaffolds **unless** specifically exempted or when the issue is specifically addressed in a specific section for a particular type of scaffold. The requirements for guardrails on scaffolds was specified at a height of 10' (less than 10' in height was omitted) for paragraph .451(b) through .451(y) (standards for particular type scaffolds). Therefore, the .451(a)(4) standard does not apply to any, 451(h) through 451(y), such as proprietary or make shift type scaffolds. Also, clarification of "10' above the ground or floor" was given - it is the falling distance, not the vertical dimension of the scaffold that is the controlling factor.

OSHA CLARIFICATION LETTER

Date 12/88; From Director of Compliance Programs to Regional Administrator; Synopsis - Guardrails not required -for Ladder Jack Scaffolds because they may pose additional hazards and increase risk. The OSHA proposed rule requires the use of a body harness/belt and lanyard for fall protection on these scaffolds.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

An employee using a makeshift single plank scaffold to apply stucco approximately 7'-8' above the ground with no fall protection.



VIOLATION IN-COMPLIANCE

Front and side view (above) of a make shift scaffold 4'-6' above the ground. No fall protection is provided.
NOTE: The opening between the scaffold platforms and the unsecured portable ladder.

RANK IN FREQUENCY CITED	1926.	SPOIL PILE PROTECTION
#16	651(j)(2)	

RULE: *Employee shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.*

INTENT:

The intent of this standard is two-fold, by requiring excavated material (spoils) and equipment to be set back 2 feet it accomplishes the following: 1) decreases the risk of spoils or equipment from rolling back into the excavation on top of employees; and 2) reduces superimposed loads on the face of the excavation which possibly could contribute to a cave-in. If the superimposed load of the spoils has been considered in the design of the protection system the spoils may be placed at the face of the excavation if they are retained by a sufficient (strength, i.e. can resist any reasonably anticipated forces applied to it, and/or height) device/operation such as barricading or wire mesh.

HAZARDS:

1. Cave-in caused by superimposed load on face of excavation. Probable injury is death.
2. Rolling/falling spoils or equipment; Probable injuries could be expected to range from head concussion to bruises. Extreme cases could result in death due to suffocation.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Conduct a pre-job survey of site to insure the location is large enough to accommodate 2 foot set back for the spoil pile. If not, materials must be obtained to provide an alternate retaining device.
- In some cases contractor may need to haul spoils to a temporary site until excavation is ready to back fill.

SELECTED CASE HISTORIES:

A spoil pile had been placed on top of a curb which formed the west face of a trench. A backhoe was spotted on top of the spoil pile. The west face of the trench collapsed on two employees who were installing sewer pipe. One employee was killed; the other received back injuries. The trench was 8 feet deep with vertical walls. No other protection was provided. In fact, the superimposed loads of the spoil pile and backhoe may have initiated the collapse.

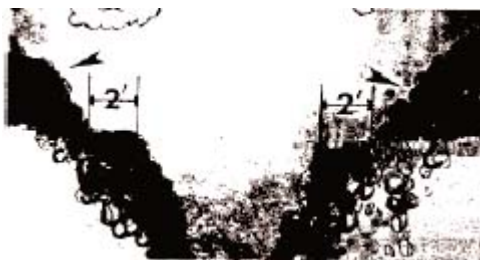
COMMENTS:

1. Many excavations/trenches dug for utility line are located in narrow right-of-ways. Often spoil piles are placed at the edge with no retaining device. This situation can be avoided with a sound pre-job survey and plan.
2. The fatality rate for trenching/excavation work was 112% higher than the rate for construction in general [14].
3. This standard was cited in 37 fatality inspections since it became effective in March 1990.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 651(j); [14]; [20]; GUIDE FOR THE DAILY INSPECTION OF TRENCHES AND EXCAVATIONS (See pg.53)

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Proper spoil pile set back (above & right).
Arrows show spoil piles.





VIOLATION IN-COMPLIANCE

Two employees along pipe are exposed to the spoil pile (arrow) which is located on the edge of the trench. NOTE: Sloping does not meet OSHA requirements.



VIOLATION IN-COMPLIANCE

Employee at end of pipe is exposed to the spoil pile at the edge of the trench.

RANK IN FREQUENCY CITED	1926.	SECURING OF COMPRESSED GAS CYLINDERS
#17	350(a)(9)	

RULE: Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.

INTENT:

This standard specifies the following: 1) gas cylinders must be secured to prevent them from falling against people equipment and other cylinders; if a cylinder strikes a person it can cause an impact type injury, if it strikes nearby equipment the consequences will vary depending on the type of equipment if the first cylinder strikes other unsecured cylinders a domino effect may occur; an unsecured cylinder with its valve protection cap off could fall and strike the valve, rupturing it, causing the compressed gas cylinder to take-off like a rocket; and 2) the cylinders must be stored upright since adverse effects can result if cylinders containing some welding gases are stored/used in a horizontal position. This standard exempts hoisting or carrying cylinders that are only intended to be moved during short periods of time.

HAZARDS:

- Struck by falling or rocketing cylinders. injuries can range from death to contusions.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Supervisors should note all cylinders in their work area and identify if they are in use or storage. If they are in storage, are they upright, secured and labeled? Is the valve protection cap in place? Are incompatible materials (oxygen and fuel gas) separated properly? If the cylinders are in use, are all appropriate safeguards in place to protect the welder and other personnel in the area?

SELECTED CASE HISTORIES:

OSHA IMIS did not maintain any fatal/catastrophe inspections citing conditions related to this standard as a direct/indirect cause(s) of an accident.

COMMENTS:

1. Welding cylinders placed in welding carts are considered to be secured.

2. Unsecured cylinders on construction sites are common. This is a specification standard which is easily identified and substantiated as a violation as evident of its high ranking on the 100 **Most Cited Physical List**. Therefore, the contractor must continually audit the site to ensure compliance.
3. This standard was cited in 29 OSHA fatality inspections in 5 years.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 350; [22]; [23]*; [24]

*- Referenced in 29 CFR 1926 - Construction Standards

OSHA INSTRUCTION STD 3-8.2

Dated 3/11/81 - Synopsis - Clarifies that the standard does not apply to welding gas supply manufacturers or distributors prior to delivery at construction sites. The intent of the standard is for it to apply to welding or cutting operations on construction sites.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



**CYLINDERS
ARE BEST
SECURED
IN A CART**

VIOLATION IN-COMPLIANCE

The cylinders (above & right) are secured properly in an upright position. NOTE: Cylinders are not required to be secured to a cart as shown above. This method is only a recommendation.



VIOLATION IN-COMPLIANCE

The cylinders are not secured (left) and are not secured in an upright position (above). NOTE: Improper storage of oxygen and fuel gas cylinders in photo on left.

RANK IN FREQUENCY CITED	1926.	ADDITIONAL RULES FOR WELDING/ CUTTING AS PER ANSI Z49.1 - 1967
#18	350(j)	

RULE: Additional rules. For additional detail not covered in this subpart, applicable technical portions of American National Standards Institute, Z49.1 1967, Safety In Welding and Cutting, shall apply.

INTENT:

This ANSI standard was incorporated by reference into the original OSHA construction standards and remains today. Its intent is to supplement the safety, requirement for gas welding. Additional requirements cover the following: 1) installation and operation of oxygen-fuel gas systems for welding and cutting; 2) fire prevention and protection; 3) protection of personnel; 4) health protection and ventilation; and 5) industrial applications. Construction industry applications are further subdivided by operation, those operations include: A) general; B) general maintenance welding and cutting operations; C) earth moving and grading equipment; D) fire protection and prevention; E) demolition; F) concrete construction and masonry; G) tunnels, shafts and caissons; H) marine piling and marine construction; I) batch plant and road paving; J) steel erection; K) transmission pipeline; and L) mechanical piping systems.

HARZARDS:

1. Fire/explosion. Probable injuries range from death to minor burns.

(AMONG OTHER) SUGGESTED ABATEMENTS:

1. A pre-job survey to identify all potential hazards and affected areas around the operation is critical.
2. All fire prevention and protection rules absolutely must be followed.

SELECTED CASE HISTORIES:

1. A welder was cutting braces on a catwalk of a conveyor when the catwalk collapsed falling approximately 30' to the ground killing the welder.
2. Three employees were cutting (burning) a catwalk from the top of a 20,000 gallon ethanol storage tank which had been drained of liquid but the vapors were not purged. Vapors emanating from a gage hatch which was not sealed were ignited and the tank exploded. The three employees were fatally injured. The area (not designed for cutting purposes) was not properly inspected and authorized prior to the start of the operation.

COMMENTS:

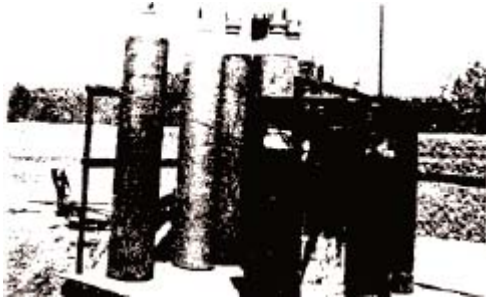
1. The most common standard cited from ANSI 249.1-1967 is 3.2.4.3, which specifies a 20 foot minimum spacing or ½ hour minimum fire rated wall 5 feet high separating oxygen cylinders from fuel gas cylinders in storage. Other commonly cited standards include: using acetylene at a pressure greater than 15 psig (3.1.2) and failure to inspect and authorize an operation when welding or cutting must be done in a location not designed for such purposes (6.2.5).
2. This rule only applies to gas welding. It does not apply to arc welding, resistance welding or other non-gas welding procedures

ADDDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Subpart J; [24]; [281]*

*- Referenced in 29 CFR 1926- Construction Standards

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Oxygen and fuel gas cylinders stored together without proper separation or barriers.

NOTE: The missing valve protection cap on the front of the cylinder bottle.



VIOLATION IN-COMPLIANCE

Oxygen cylinders in storage separated from fuel gas cylinders by a 5' tall properly constructed and rated fire wall (arrow).

RANK IN FREQUENCY CITED	1926.	EYE/FACE PROTECTION FOR OPERATIONS WHICH CREATE EXPOSURE
#19	102(a)(1)	

RULE: Employees shall be provided with eye and face protection equipment when machines or operations present potential eye or face injury from physical, chemical, or radiation agents.

INTENT:

There were about 22,000 lost-time accidents in the construction industry in 10 states from 1985-1989 due to eye injuries [6]. Metal items (34.5%) and wood items (10.7%) were the most frequent sources of eye injuries. The purpose of the standard is obvious - to reduce the number of eye injuries. The rule requires employers to provide eye/face protection when there are potential hazards to the eye/face related to physical, chemical, or radiation agents. The key word is potential. On very few construction sites would potential for falling, flying, moving, etc. objects not be present. Sometimes pieces of debris break off, spring, eject, etc. from objects which are usually intact. Once airborne, potential exist to cause an eye/face injury (example - prying on a wooden box, when a splinter breaks due to the force (energy) of the prying operation, the splinter might be thrown in the direction of the employees face). Although these types of events are not normal, they can and should be expected because of the nature of construction work. Therefore, protection must be provided. Other standards in this Part include 1926.102(a)(2) which specifies that eye/face PPE will meet requirements of ANSI Z87.1-1968, UT [15] and 1926.102(a)(5), which specifies that Table E-1 [I] shall be used as guidance for selecting appropriate protection for listed operations. This is a very useful and user friendly table. All spectacle type glasses listed in TABLE E-1 require sideshields. A footnote in the table states spectacles without sideshields are available when only frontal exposure is possible. Most construction operations would require sideshields.

HAZARDS:

- Struck by flying objects, particles, and chemicals. Probable eye injuries can range from blindness to minor irritation caused by foreign matter in the eye. Probable injuries to the face range from chemical burns caused by splashes to lacerations caused by flying objects.
- Radiant energy exposure from welding and laser operations. Probable injuries range from blindness to temporary eye irritation.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Instruct fast-line supervisors to continually audit employees to insure eye/face protection is worn.

- Institute a formal discipline program in workplaces where a problem exist relating to employees not wearing PPE when required.
- Make the wearing of PPE in accordance with company rules a specific condition of employment. This has proven to be an effective tool for safety managers (Conversations with safety managers).

SELECTED CASE HISTORIES:

IMIS data did not show violations of this standard contributing to the direct cause of a fatality/catastrophe. However, numerous severe lost-time injuries are related.

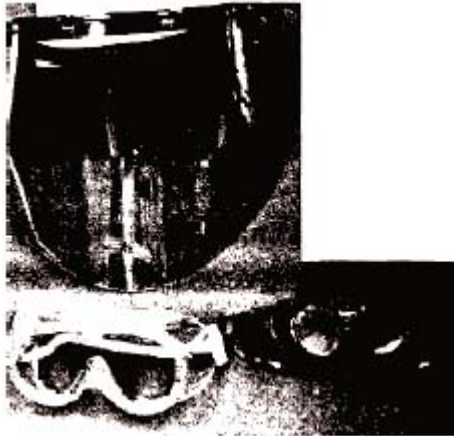
COMMENTS:

1. This rule requires employers to actually provide the eye/face protection to the employees.
2. This standard was cited in 17 fatality inspections conducted by OSHA in five years.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 102, TABLES E-1, E-2 & E-3; [15]*; [25]
 *- Referenced in 29 CFR 1926- Construction Standards

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Types of eye and face protection that are required depending on the operation.



VIOLATION IN-COMPLIANCE

Employee is wearing the proper goggles while cutting steel for stairway.

RANK IN FREQUENCY CITED	1926.	GUARDING OF FLOOR OPENINGS
#20	500(b)(1)	

RULE: Floor openings shall be guarded by a standard railing and toeboards or cover, as specified in paragraph (f) of this section. In general, the railing shall be provided on all exposed sides, except at entrances to stairways.

INTENT:

OSHA defines a floor opening as "An opening measuring 12 inches or more in its least dimension in any floor, roof, or platform through which persons may fall." This rule is to specifies that holes will be protected

with guardrails and toeboards or covers. It also specifies the requirements of construction for the guardrails, toeboards and covers (1926.500(f)). An exemption is given guarding the exposed side of an entrance to a stairway. Table 5.2-1 and Table 5.2-2 give details for constructing standard guardrails and toeboards. Floor hole coverings must meet the construction specifications listed in 1926.500(f) (5). Regular floor hole covers must be capable of supporting the maximum intended load and must be installed to prevent accidental displacement and covers and their supports when located in roadways and vehicle aiseways for conduits, and manholes must be designed to carry a rear axle load of two times the maximum intended load.

HAZARDS:

- Fall from elevation. Probable injuries range from death to sprains/strains.
- Struck by falling objects through floor hole. Probable Injuries range from death to head concussion.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- For new construction identify floor holes as they are created and take immediate action.
- For existing structures, survey the site prior to starting work and continue audit as renovation, repair, etc. proceeds for floor opening and holes.
- Insure all covers are constructed properly and will support the maximum intended load.

SELECTED CASE HISTORIES:

- An employee fell 16 feet to his death through an improperly guarded roof opening 36"x30" while attempting to stay clear of an overhead crane load. The improper guarding system consisted of four 2"x4" posts supported using only one nail per post and high visibility barrier tape strung between the posts.
- An employee fell through an uncovered 36" diameter hole in the top of a slurry tank and fell 32 feet to his death.

COMMENTS:

1. Many deaths occur each year when floor hole covers were removed and were not replaced or when they were constructed of materials that could not support the person/equipment load. (OSHA 1st Report of Death or Serious Injuries).
2. Toeboards are required to prevent materials from falling through the opening and striking persons below.
3. A floor hole is an opening measuring less than 12" but more than 1" in its least dimension. Floor hole protection is intended to prevent materials from falling to the level(s) below.
4. This standard was cited in 67 OSHA fatality cases in 5 years.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] sections 500(b) & (f); [19]

OSHA CLARIFICATION LETTER

Date 8/31/89; From Director of Construction Compliance Programs to Regional Administrator; Synopsis - A floor hole 60' x 40' x 12"

deep in the middle of a large finished floor is not a floor opening or hole under this standard. Additionally, a uniform enforcement policy

on floor openings is not possible because of the many variables that exist, i.e. the depth of the hole, workers exposure, etc.; therefore, each

particular situation must be evaluated by the CSHO to determine if a hazard exists.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Properly erected standard guardrail system for floor opening.

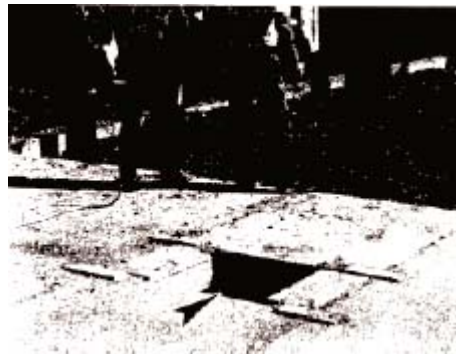


VIOLATION IN-COMPLIANCE

Employee is wearing the proper goggles while cutting steel for stairway.

VIOLATION IN-COMPLIANCE

Unguarded floor opening (arrow) which exposes workers to a 9' fall into basement.



RANK IN FREQUENCY CITED	1926.	LADDER EXTENDED 3' ABOVE LANDINGS
#21	1053(b)(1)	

RULE: When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (.9 m) above the landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder defection under a load would, by itself, cause the ladder to slip off its support.

INTENT:

The purpose of this rule is to provide protection for employees during two critical phases of ladder climbing: 1) when employees are on the ladder and their movement may cause forces to be transferred to the ladder and it's support points which might tend to make it slip or fall; and 2) when the employee is either getting on or off the ladder - if nothing is available to grab and provide support the employee will be in a bent over position and his/her center of gravity may be outside the vertical line of normal body position in an attempt to correct this and straighten up and get onto the ladder the employee is vulnerable to a fall. The rule

specifies: 1) that the side rails must extend three feet above the landing; 2) side rails must be secured at the top to a rigid support when the 3 foot extension is not provided (this can be done by tying with rope boxing in with lumber, etc.); 3) a grab device must be provided when the ladder's side rails do not extend 3 feet above the landing (the grasping device can be constructed of materials such as metal, lumber, etc., it can be a part of the structure providing it's location does not create a hazard in itself and it's easy grasped); and 4) when employees are on the ladder its deflection cannot cause it to slip off its support; therefore, when selecting/spotting a ladder, consider the amount it will deflect during use to assure that the proper length is used.

HAZARDS:

Fall from elevation. Probable injuries range from death to sprain/strains.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Abatement is obvious - construct/use ladders according to specification requirement.
- Instruct first-line supervisors to inspect ladders during each shift in their work area.

SELECTED CASE HISTORIES:

An employee was climbing a 10 foot ladder to access a landing which was 9 feet above the adjacent floor. The ladder slid down and the employee fell to the floor, sustaining fatal injuries. Although the ladder had slip-resistant feet, it was not secured, and the railings did not extend 3 feet above the landing.

COMMENTS:

1. This standard covers only portable ladders. A similar requirement for fixed ladders is 1926.1053(a)(24).
2. This is a specification standard which is easily identified and substantiated as a violation as evident by it's high ranking on the 100 **Most Cited Physical List** Therefore, the contractor must continually audit the site to remain in compliance with this item.
3. The standard was cited in 6 fatality/catastrophe inspections since January, 1991.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Subpart X; [18]

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

The portable ladder extends 3' above the opening (landing) of the confined space. NOTE: The guarding of the floor hole except at the entrance for the ladder is acceptable.



VIOLATION IN-COMPLIANCE

The job made ladder is secured (arrow) and extended 3' above the landing. NOTE: The exposure to the open-sided floor when employees are on the landing would be a violation of 1926.500(d)(1)



VIOLATION IN-COMPLIANCE

The job made ladder does not extend at least 3' above landing, nor is it secured against tipping.

RANK IN FREQUENCY CITED	1926.	EGRESS FROM TRENCH/ EXCAVATION
#22	651(c)(2)	

RULE: Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employee.

INTENT:

When conditions begin to deteriorate in a trench, such as soil beginning to slug off the face of the trench, the risk of a cave-in increases and emergency egress may be required. This standard requires a means of egress. The intent of the rule is to specify the following: 1) maximum lateral distances an employee can travel (25 feet) to egress a trench; 2) maximum depth of the trench (4 feet) when egress must be provided; and 3) means in which egress from the trench can be accomplished, i.e. stairway, ladder, ramp, or other safe means. Note: It is not intended that this rule apply to large excavations ([14], pg. 45918). However, a safe means of access/egress from large excavations must be provided as per 29 CFR 1926.1051(a). That standard requires a stairway or ladder be provided at personnel points of access where there is a break in elevation of 19 inches or more, and no ramp runway, sloped embankment or personnel hoist is provided.

HAZARDS:

- Cave-in. Probable injury is death.
- Hazardous atmospheres caused by broken utility lines, toxic materials entrained in soil, etc. Large range of injuries from death due to inhalation of toxic material to first aid.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Provide properly constructed /maintained means of egress at predetermined points.

SELECTED CASE HISTORIES:

- Two employees were in a 12 foot deep trench laying pipe when one of the employees saw the bottom face of the trench move and jumped out of the way along the length of the trench as the wall caved-in fatally injuring the other employee. The walls of the trench were vertical and no means of emergency egress was provided.
- Two employees laying sewer pipe were in a 15 foot deep trench, which was not shored or sloped properly. The employees had to egress the trench by climbing the backfill. While exiting the trench the first worker was trapped by a small cave-in. The second employee tried to extricate him but a second cave-in occurred trapping the second employee at the waist. The second cave-in actually caused the death of the first employee; the second employee sustained a hip injury.

COMMENTS:

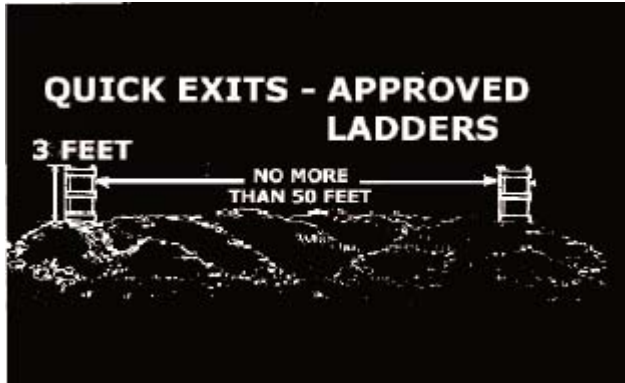
1. Only one means of egress is required in the middle of a trench 50' long to meet the requirements of this standard.

- 2. Earthen ramps may be used as a suitable means of egress only if employees can walk the ramp in an upright position when entering and exiting. The earthen ramp must be evaluated as acceptable by the competent person.
- 3. This standard was cited in 24 fatality inspections conducted by OSHA since January 1991.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Subpart P; [14]; [20]

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Required for trench/excavations >4 feet deep.



VIOLATION IN-COMPLIANCE

No means of egress provided. Employee is riding backhoe bucket out of trench.

RANK IN FREQUENCY CITED	1926.	LISTED, LABELED OR CERTIFIED EQUIPMENT USED IN MANNER PRESCRIBED
#23	403(b)(2)	

RULE: Listed, labeled, or certified equipment shall be installed and used in accordance with instructions included in the listing, labeling, or certification.

INTENT:

At times electrical equipment is installed or used in a manner for which it was not designed. This is one of the electrical standards which is used as a "catch all" for hazardous situations which are not covered by specific electrical standards. While the application of this standard may be broad, the intent is to ensure that all electrical equipment is used/installed as designed. The most common specific application of this standard as used by OSHA in construction is to address the situation when a multiple-receptacle box designed to be mounted is fitted with a power cord and placed on the floor to provide power for various tools. This would

not be a prescribed use for the receptacle box. OSHA also cites this standard for the use of ROMEX® wire for making up extension cords; using equipment outdoors which is only listed and labeled for in indoor dry locations (this can even apply to double insulated tools which are listed and labeled for dry indoor locations only); short two-prong adapter plugs with pig tail equipment grounding connections to facilitate the attachment of cords and tools to electrical systems; and the use of the wrong size circuit breakers or fuses for overcurrent protection. The situations listed above would not be in accordance with the equipment's prescribed use.

HAZARDS:

- Electrical shock. Probable injuries can vary from death to minor burns.
- Fire. Probable injuries can vary from third degree to minor burns.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Since most violations rated to this standard are the result of original equipment being shop fabricated, altered, modified, etc. instruct first-line supervisors to watch for such equipment and determine if it is in compliance with OSHA/NEC. If not, take equipment out of service immediately.

SELECTED CASE HISTORIES:

An employee was texturing a wall using an air compressor. The plug of the compressor and an extension cord had been modified to fit a wall outlet for a common household dryer (220 V). While attempting to unplug the compressor from the extension cord, the employee was fatally shocked. The modification to the plugs was not an intended use or prescribed by the manufacturer.

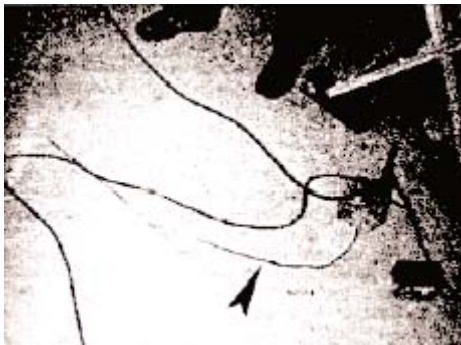
COMMENTS:

1. The shop-fabricated multi-receptacle box laying on the floor is quite common in the industry. After, OSHA CSHO's become familiar with this problem it becomes as easy a violation to identify and substantiate as many of the specification standards.
2. If an installation is made in accord with the 1984 National Electric Code, it will be considered to be in compliance with Section 1926.403 thru 1926.408, except 1926.404(b)(1), 1926.405(a)(2)(ii)(E), 1926.405(a)(2)(ii)(F), 1926.405(a)(2)(ii)(G), & 1926.405(a)(2)(ii)(J).
3. This standard was cited in seven fatality inspections conducted by OSHA in 5 years.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Subpart K; [2]; [3]

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Multi-receptacle outlet box on the floor providing power to 3 extension cords. The supply power to the outlet box is provided by non-metallic sheath (NM) cable (arrow). The manner in which the outlet box and NM cable is used is not a prescribed use.



VIOLATION IN-COMPLIANCE

NM cable is being run across a field (above) to provide power to an outlet laying on ground (blow-up). It is being utilized as an extension cord. The use of the NM cable and outlet in this manner is not a prescribed use. NOTE: The NM cable is run on ground is not protected from damage (this particular cable was run across a subdivision street). When NM cable is used on a construction site it must be used in a manner prescribed such as wiring for feeders, branch lines and temporary lighting. Additionally, it must be installed properly and must be protected from physical damage.

RANK IN FREQUENCY CITED	1926.	FLEXIBLE CORDS DESIGNATED FOR HARD OR EXTRA HARD USAGE
#24	405(a)(2)(ii)(j)	

RULE: Extension cord sets used with portable electric tools and appliances shall be three-wire type and shall be designed for hard or extra-hard usage. Flexible cords used with temporary and portable lights shall be designed for hard or extra hard usage.

INTENT:

Extension cords when exposed to even "normal" construction use can experience rapid deterioration. When this happens, conductors with energized bare wires can be exposed. Conductors can break or come loose from their terminal screws, specifically the equipment grounding conductor. If that should occur the equipment grounding for the tool in use is lost. Since deterioration occurs more rapidly in cords which are not rugged enough for construction conditions, the National Electric Code [5] and OSHA have specified the types of cords to use in a construction environment. This rule designates the types of cords that must be used for various applications including portable tools, appliances, temporary and portable lights. The cords are designated **HARD and EXTRA HARD SERVICE**. Examples of **HARD SERVICE** designation types include **S, ST, SO, STO, SJ, SJO, SJT & SJ . TO**

Extension cords must be durably marked as per 1926.405(g)(2)(ii) with one of the HARD or EXTRA HARD SERVICE designation letters, size and number of conductors.

HAZARDS:

Electrical shock. Probable injuries range from death to minor burns.

(AMONG OTHER) SUGGESTED ABATEMENTS:

Continually audit cords on-site. Any cords found not to be HARD or EXTRA HARD SERVICE must be taken out of service immediately.

SELECTED CASE HISTORIES:

An employee received a fatal shock when he was cutting drywall with a metal casing router. The router's 3-wire power cord had been spliced to a 2-wire cord and plug. A fault occurred and with no grounding and the absence of GFCI protection, the employee was electrocuted. The cord was not a 3-wire HARD SERVICE variety.

COMMENTS:

1. The durable marking required to be on the cord can be found as an indelible marking by the manufacturer

approximately every foot along the length of the cord.

2. Because the use of extension cords is so numerous at construction sites and this is a specification standard, the number of related violations is quite high. For the OSHA CSHO this situation is relatively easy to identify and substantiate as a violation.

3. Because of the constant movement of contractors and equipment, specifically extension cords, on/off-site and the fact that sometimes several contractors draw power utilizing the same extension cord, identifying improper service cords may be difficult.

4. This standard was cited in 20 fatality inspections in last 5 years.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Sections 405(b) & (g); [2], [3]

OSHA CLARIFICATION LETTER

Date 3/3/92; From Director of Compliance Programs to Director of Office of Construction and Engineering; Synopsis Contractor shop-made extension cords are acceptable if they meet the following criteria; 1) all individual components of the cord set must be approved by a nationally recognized testing laboratory; 2) the cord sets must meet all applicable requirements such as strain relief, correct polarity of conductors, proper marking, etc.; 3) cords must be assembled by a qualified person; and 4) the cord set must be checked prior to its first use, for example, the following tests should be performed a) all equipment grounding conductors shall be tested for continuity and shall be electrically continuous and b) each receptacle and attachment plug must be tested to insure proper connection of the equipment grounding conductor to its appropriate terminal.

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Hard service cord TYPE SO (arrow).
NOTE: The strain relief devices for ends of the attachment plugs.



VIOLATION IN-COMPLIANCE

2 wire ribbon type cord is not designed for HARD USAGE.
NOTE: The 2 wire cord does not provide equipment grounding. Additionally, there are exposed terminal screws and conductors on the end of the cord which create a shock hazard.

RANK IN FREQUENCY CITED	1926.	STRAIN RELIEF FOR CORDS
#25	405(g)(2)(iv)	

RULE: Flexible cords shall be connected to devices and fittings so that strain relief is provided which will prevent pull from being directly transmitted to joints or terminal screws.

INTENT:

The deterioration of electrical cords on construction sites is a common occurrence. If a cord deteriorates to a

point where conductors have effectively worn through their insulation or equipment grounding conductors are no longer attached to their terminal screws, an electric shock hazard is created. Many times deterioration of the cord is due to the strain, both normal and abnormal, it experiences on the site. One of the weak points of a cord assembly is the area in which attachments are made (plug cap and connector body). When devices or fittings designed to relieve cord strain are not used, insulation will tend to pull back and expose conductors or the conductors will loosen from their terminal screws. Therefore, this standard requires hardware to prevent tension from being transmitted to joints and terminal screws. Manufactured molded plug caps and associated connections usually do not pose this problem under normal use. However, site-fabricated cords or cords that have been repaired in the field frequently do not have sufficient strain relief. Loose wires in a plug cap caused by improper connection or tension due to no strain relief can cause conductors to make contact where not intended causing short-circuit, fires, arching type explosion, etc.

HAZARDS:

Electrocution and fire. Probable injuries can range from death to first degree burns.

(AMONG OTHER) SUGGESTED ABATEMENTS:

- Use approved cords for HARD or EXTRA HARD USAGE (Designated S, ST, SO, STO, SJ, SJO, SJT or SJTO).
- Use only cords which are equipped or designed with strain relief.
- Use factory-assembled cord sets as much as possible.
- Reinforce the simple work practice that everyone learned when they were children -remove cords from receptacles by pulling on the plugs, not the cords.

SELECTED CASE HISTORIES:

An employee operating a 3/4" electric chisel was electrocuted. An electrical fault occurred in the casing of the tool. An inspection revealed that the original power cord had been replaced with a flat cord (not designed for HARD service), the ground prong was missing and strain relief was not provided for the cord at the point it entered the tool. Additionally, no GFCI protection was provided.

COMMENTS:

1. There is no prohibition against fixing a cord or reattaching it to a plug. However, care must be taken to assure the original electrical and mechanical integrity of the cord is maintained.
2. Splices to flexible cords and cables are prohibited under 1926.405(g)(2)(iii) if their service rating is less than Hard Service No. 12. If the service rating is greater than No. 12 splices may be made provided they meet other mechanical requirements.
3. This standard was cited in 20 fatality inspections conducted in five years.

ADDITIONAL DOCUMENTS TO AID IN COMPLIANCE:

[1] Section 405; [2]; [3]; [21] Fact Sheet #5; Pull at Joints & Terminals Must Be Prevented

PHOTOGRAPHS, ILLUSTRATIONS and OTHER DOCUMENTS



VIOLATION IN-COMPLIANCE

Strain relief provided for plug on cord.



VIOLATION IN-COMPLIANCE

The insulation of the cord (arrow) is pulling away from plug. The plug had earlier been repaired and its original molded plug strain relief was compromised. Additionally, strain relief was not provided at the time of repair resulting in condition shown above.

5.2 CONSTRUCTION SPECIFICATIONS FOR GUARDRAILS AND TOEBOARDS

The following section presents construction specifications for guardrails and toeboards. These specifications relate to **GUIDE** Sheets #1, #6, #12, #15 and #20 listed above in Section 5.1. These tables compile the requirements for "standard guardrails and toeboards or their equivalent". Table 5.2-1 lists construction specifications for guardrails and Table 5.2-2 lists construction specifications for toeboards.

**TABLE 5.2-1
MINIMUM SPECIFICATIONS FOR GUARDRAIL SYSTEMS**

TYPE OF MATERIAL	SIZE OF TOP/ MID RAIL [IN]	HEIGHT [IN] TOP RAIL	POST SIZE/ SPACING	STRENGTH [LBS.]
WOOD	2x4/1x6	42	2"x4"/8'	200
PIPE	1-½ nominal OD	42	1-½ nom./8'	200
STEEL	2x2x3/8 angle	42	2"x2"x3/8" angle/8'	200 or equiv. bend. strength
WIRE ROPE	3/8	42	equivalent to one of above	200
OTHER EQUIVALENT	equivalent to one of above	42	equivalent to one of above	200

Employer Rights and Responsibilities Following an OSHA Inspection

This informational booklet provides a general overview of a particular topic related to OSHA standards. It does not alter or determine compliance responsibilities in OSHA standards or the *Occupational Safety and Health Act of 1970*. Because interpretations and enforcement policy may change over time, you should consult current OSHA administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the Courts for additional guidance on OSHA compliance requirements.

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This information is available to sensory impaired individuals upon request. Voice phone: (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

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Occupational Safety and Health Administration
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After an OSHA Inspection

This pamphlet contains important information regarding your rights and responsibilities under the *Occupational Safety and Health Act of 1970 (OSH Act, Public Law 91-596, as amended by P.L. 101-552, November 5, 1990)*.

An OSHA compliance safety and health officer (CSHO) conducts an inspection of your workplace, in accordance with the *OSH Act*. After the inspection, the CSHO reports the findings to the Area Director who evaluates them. If a violation exists, OSHA will issue you a **Citation and Notification of Penalty** detailing the exact nature of the violation(s) and any associated penalties (see also OSHA 2098 *OSHA Inspections*). A citation informs you of the alleged violation, sets a proposed time period within which to correct the violation, and proposes the appropriate dollar penalties.

The information in this booklet can and should be used as a discussion guide during your closing conference with the OSHA compliance officer. For each apparent violation found during the inspection, the compliance officer has discussed or will discuss the following with you:

- Nature of the violation,
- Possible abatement measures you may take to correct the violative condition, and
- Possible abatement dates you may be required to meet, and
- Any penalties that the Area Director may issue.

The CSHO is a highly trained professional who can help you recognize and evaluate hazards as well as suggest appropriate methods of correcting violations. To minimize employee exposure to possible hazardous conditions, abatement efforts should always begin as soon as possible.

Important Note: There are currently 26 states or territories administering OSHA-approved safety and health plans: 23 of these plans cover the private and public (state and local governments) sectors and 3 cover the public sector only. For more information employers and employees in these 26 states and territories should check with their state agencies. State plans may include standards, regulations, and procedures that, while at least as effective as their federal equivalents, are not always identical to them. For example:

- Some states have different options and procedures for the employer who believes changes, modifications, or deletions of the penalty, citation, or abatement dates are needed;

- Although Federal OSHA recommends that employers in general industry, shipbuilding and repair, and marine terminal and longshoring operations, establish comprehensive workplace safety and health programs, some states require such programs; and
- In states with OSHA-approved safety and health plans, an employee who believes he/she has been discriminated against pursuant to Section 11(c) of the *OSH Act* is entitled to file a complaint alleging discrimination under both state and federal procedures.

The following general information defines the types of violations and explains the actions you may take if you receive a citation as the result of an inspection.

Types of Violations

Willful: A willful violation is defined as a violation in which the employer knew that a hazardous condition existed but made no reasonable effort to eliminate it and in which the hazardous condition violated a standard, regulation, or the *OSH Act*. Penalties range from \$5,000 to \$70,000 per willful violation.

Serious: A serious violation exists when the workplace hazard could cause injury or illness that would most likely result in death or serious physical harm, unless the employer did not know or could not have known of the violation. OSHA may propose a penalty of up to \$7,000 for each violation.

Other-Than-Serious: An other-than-serious violation is defined as a situation in which the most serious injury or illness that would be likely to result from a hazardous condition cannot reasonably be predicted to cause death or serious physical harm to exposed employees but does have a direct and immediate relationship to their safety and health. OSHA may impose a penalty of up to \$7,000 for each violation.

De Minimis: De minimis violations are violations that have no direct or immediate relationship to safety or health and do not result in citations.

Other: A violation that has a direct relationship to job safety and health, but is not serious in nature, is classified as "other."

Failure to Abate: A failure to abate violation exists when the employer has not corrected a violation for which OSHA has issued a citation and the abatement date has passed or is covered under a settlement agreement. A failure to abate also exists when the employer has not complied with interim measures involved in a long-term abatement within the time given. OSHA may impose a penalty of up to \$7,000 per day for each violation.

Repeated: An employer may be cited for a repeated violation if that employer has been cited previously for a substantially similar condition and the citation has become a final order of the Occupational Safety and Health Review Commission. A citation is currently viewed as a repeated violation if it occurs within 3 years either from the date that the earlier citation becomes a final order or from the final abatement date, whichever is later. Repeated violations can bring a civil penalty of up to \$70,000 for each violation.

For purposes of determining whether a violation is repeated, the following criteria generally apply:

1. **Fixed Establishments:** Citations issued to employers having fixed establishments (such as factories, terminals, and stores) are not normally limited to the cited establishment. A multifacility employer, for example, can be cited for a repeated violation if the violation recurred at any plant nationwide, and if a citation is obtained and reveals a repeated violation.
2. **Nonfixed Establishments:** For employers engaged in businesses having no fixed establishments (such as construction sites and oil and gas drilling sites), repeated violations are alleged based on prior violations occurring anywhere, and at any of the employer's identified establishments nationwide, based on employer history.
3. **Longshoring Establishments:** A longshoring establishment covers all long-shoring activities of a single stevedore within any single port area. Longshoring employers are subject to repeated violation citations based on prior violations occurring anywhere in the nation.

4. **Other Maritime Establishments:** Other maritime establishments covered by OSHA standards (such as shipbuilding and ship repairing) are generally defined as fixed establishments. (See 1 above.)

A VIOLATION CAN BE CITED AS REPEATED IF THE EMPLOYER HAS BEEN CITED FOR THE SAME OR A SUBSTANTIALLY SIMILAR VIOLATION ANYWHERE IN THE NATION WITHIN THE PAST 3 YEARS.

Posting Requirements

When you receive a Citation and Notification of Penalty, you must post the citation (or a copy of it) at or near the place where each violation occurred to make employees aware of the hazards to which they may be exposed. The citation must remain posted for 3 working days or until the violation is corrected, whichever is longer. (Saturdays, Sundays, and Federal holidays are not counted as working days.) **You must comply with these posting requirements even if you contest the citation.**

The abatement certification documents—such as abatement certifications, abatement plans and progress reports—also must be posted at or near the place where the violation occurred. For moveable equipment found to be in violation and where the posting of violations would be difficult or impractical, the employer has an option to identify the equipment with a “Warning” tag specified in the abatement verification regulation Title 29 *Code of Federal Regulations CFR* 1903.19(i).

Employer Options

As an employer who has been cited, you may take either of the following courses of action:

- If you agree to the Citation and Notification of Penalty, you must correct the condition by the date set in the citation and pay the penalty, if one is proposed;
- If you do not agree, you have 15 working days from the date you receive the citation to contest in writing any or all of the following:
 - Citation,
 - Proposed penalty, and/or
 - Abatement date.

OSHA will inform the affected employee representatives of the informal conference or contest.

Before deciding on either of these options, you may request an informal conference with the OSHA Area Director to discuss any issues related to the citation and notification of penalty. (See **Informal Conference and Settlement**.)

How to Comply

For violations you do not contest, you must: (1) promptly notify the OSHA Area Director by letter signed by a member of management that you have taken the appropriate corrective action within the time set forth in the citation, and (2) pay any penalties itemized.

The notification you send the Area Director is referred to as **Abatement Certification**. For Other-Than-Serious violations, this may be a signed letter identifying the inspection number and the citation item number and noting that you corrected the violation by the date specified on the citation. For more serious violations (such as Serious, Willful, Repeat, or Failure-to-Abate), abatement certification requires more detailed proof.

If the employer has abatement questions after the inspection, the Area Director must ensure that additional information, if available, is provided to the employer as soon as possible.

Employers also can find guidance on abatement verification on OSHA’s website at www.osha.gov/Publications/Abate/abate.html.

When the citation permits an extended time for abatement, you must ensure that employees are adequately protected during this time. For example, the citation may require the immediate use of personal protective equipment by employees while engineering controls are being installed. When such is the case and where indicated on the citation, you must also provide OSHA with an abatement plan (steps you will take to protect employees and correct the hazards) and periodic progress reports on your actions.

The penalties itemized on the citation and notification of penalty are payable within 15 working days of receipt of the penalty notice. If, however, you contest the citation or penalty in good faith, OSHA will suspend abatement and payment of penalties for those items contested until the Occupational Safety and Health Review Commission or a higher court issues a final order or rule. The Review Commission is an independent agency and is **not** a part of the U.S. Department of Labor. The final order of the Commission will either uphold, modify, or eliminate the citations and/or penalties. Penalties for items not contested, however, are still due within 15 working days. (For further details, see the section on **How to Contest** .)

Payment should be made by check or money order payable to DOL-OSHA. Please indicate on your payment the OSHA number from the upper right-hand corner of your citation and **send it to the OSHA Area Office listed on the citation and notification of penalty.**

Informal Conference and Settlement

Before deciding whether to file a **Notice of Intent to Contest**, you may request an informal conference with the OSHA Area Director to discuss the citation and notification of penalty. You may use this opportunity to do any of the following:

- Obtain a better explanation of the violations cited;
- Obtain a more complete understanding of the specific standards that apply;
- Negotiate and enter into an informal settlement agreement;
- Discuss ways to correct violations;
- Discuss problems concerning the abatement dates;
- Discuss problems concerning employee safety practices;
- Resolve disputed citations and penalties, (thereby eliminating the need for the more formal procedures associated with litigation before the Review Commission); and
- Obtain answers to any other questions you may have.

OSHA encourages you to take advantage of the opportunity to have an informal conference if you foresee any difficulties in complying with any part of the citation. **Please note, however, that an informal conference must be held within the 15 working day Notice of Intent to Contest period and will neither extend the 15 working day contest period nor take the place of the filing of a written notice if you desire to contest.** Employee representative(s) have the right to participate in any informal conference or negotiations between the Regional Administrator or Area Director and the employer.

If you agree that the cited violations exist, but you have a valid reason for wishing to extend the abatement date(s), you may discuss this with the Area Director in an informal conference. He or she may issue an amended citation that changes the abatement date prior to the expiration of the 15-working-day period without your filing a Notice of Intent to Contest.

If you do not contest within 15 working days, your citation will become a final order not subject to review by any court or agency. After this occurs, the OSHA Area Director may continue to provide you with information and assistance on how to abate the hazards cited in your citation, but may not amend or change any citation or penalty which has become a final order. The Area Director may only advise you on abatement methods or extend the time you need to abate the violation. (See **Petition for Modification of Abatement** .)

Whenever the employer, an affected employee, or employee representative requests an informal conference,

the parties shall be afforded the opportunity to participate fully. If either party chooses not to participate in the informal conference, that party forfeits the right to be consulted before decisions are made that affect the citations. If the requesting party objects to the attendance of the other party, OSHA may hold separate informal conferences. During a joint informal conference, separate or private discussions will be permitted if either party requests them. Informal conferences may be held by any means practical.

How to Contest Citations

If you wish to contest any portion of your citation, you must submit a Notice of Intent to Contest in writing within 15 working days after receipt of the citation and notification of penalty. This applies even if you have stated your disagreement with a citation, penalty, or abatement date during a telephone conversation or an informal conference.

The Notice of Intent to Contest must clearly state what is being contested—the citation, the penalty, the abatement date, or any combination of these factors. In addition, the notice must state whether all the violations on the citation, or just specific violations, are being contested. (For example, "I wish to contest the citation and penalty proposed for items 3 and 4 of the citation issued June 27, 1990.")

Your contest must be made in good faith. OSHA will not consider a contest filed solely to avoid your responsibilities for abatement or payment of penalties a good-faith contest.

A proper contest of any item suspends your legal obligation to abate and pay until the item contested has been resolved. If you contest only the dates indicated on the citation. If you contest only some items on the citation, you must correct the other items by the abatement date and pay the corresponding penalties within 15 days of notification.

After you file a Notice of Intent to Contest, your case is officially in litigation. If you wish to settle the case, you may contact the OSHA Area Director who will give you the name of the attorney handling your case for OSHA. All settlements of contested cases are negotiated between you and the attorney according to the rules of procedure of the Occupational Safety and Health Review Commission.

The Contest Process

If you file the written Notice of Intent to Contest within the required 15 working days, the OSHA Area Director forwards your case to the Occupational Safety and Health Review Commission. The Commission assigns the case to an administrative law judge who usually will schedule a hearing in a public place close to your workplace. Both employers and employees have the right to participate in this hearing, which contains all the elements of a trial, including examination and cross-examination of witnesses. You may choose to represent yourself or have an attorney represent you. The administrative law judge may affirm, modify, or eliminate any contested items of the citation or penalty.

As with any other legal procedure, there is an appeals process. Once the administrative law judge has ruled, any party to the case may request a further review by the full Review Commission. In addition, any of the three commissioners may, on his or her own motion, bring the case before the entire Commission for review. The Commission's ruling, in turn, may be circuit in which the case arose or for the circuit where the employer has his or her principal office.

Petition for Modification of Abatement

OSHA assigns abatement dates on the basis of the best information available when issuing the citation. If you are unable to meet an abatement date because of uncontrollable events or other circumstances, and the 15 working day contest period has expired, you may file a **Petition for Modification of Abatement** (PMA) with the OSHA Area Director.

The petition must be in writing and must be submitted as soon as possible, but no later than 1 working day after the abatement date. To show clearly that you have made a good-faith effort to comply, the PMA must include all of the following information before OSHA considers it:

- Steps you have taken to achieve compliance, and dates they were taken;
- Additional time you need to comply;
- Why you need additional time;
- Interim steps you are taking to safeguard your employees against the cited hazard(s) until the abatement;
- A certification that the petition has been posted, the date of posting and, when appropriate, a statement that the petition has been furnished to an authorized representative of the affected employees. The petition must remain posted for 10 working days, during which employees may file an objection.

The OSHA Area Director may grant or oppose a PMA. If it is opposed, it automatically becomes a contested case before the Review Commission. If a PMA is granted, OSHA may conduct a monitoring inspection to ensure that conditions are as they have been described and that adequate progress has been made toward abatement. The OSHA Area Office may provide additional information on PMAs.

What Employees Can Do

Employees or their authorized representatives may contest any or all of the abatement dates set for violations if they believe them to be unreasonable. A written Notice of Intent to Contest must be filed with the OSHA Area Director within 15 working days after the employer receives the citation.

The filing of an employee contest does not suspend the employer's obligation to abate.

Employees also have the right to object to a PMA. Such objections must be in writing and must be sent to the Area Office within 10 days of service or posting. OSHA will not make a decision regarding the PMA until the issue the Review Commission resolves the issue.

Followup Inspections and Failure to Abate

If you receive a citation, a followup inspection may be conducted to verify that you have done the following:

- Posted the citation as required,
- Corrected the violations as required in the citation, and/or
- Protected employees adequately and made appropriate progress in correcting hazards during multistep or lengthy abatement periods.

In addition to providing for penalties for Failure-to-Post citations and Failure-to-Abate violations, the *OSH Act* clearly states that you have a **continuing responsibility** to comply with the OSH Act and assure your employees safe and healthful working conditions. OSHA will cite any new violations discovered during a followup inspection.

Employer Discrimination

To achieve abatement by the date set forth in the citation, employers must initiate abatement efforts promptly.

The *OSH Act* prohibits employers from discharging or otherwise discriminating against an employee who has exercised any right under this law, including the right to make safety and health complaints or to request an OSHA inspection. OSHA will investigate complaints from employees who believe they have been discriminated against. If the investigation discloses probable violations of employee rights, court action may follow.

Employees who believe they have been discriminated against must file their complaints within **30 days** of the alleged act of discrimination. For more information, contact OSHA and inquire about Section 11(c) procedures.

Providing False Information

All information the employers and employees report to OSHA must be accurate and truthful. Providing false information on efforts to abate cited conditions or in required records is punishable under the *OSH Act*.

OSHA Assistance, Services, and Programs

OSHA can provide extensive help through a variety of programs, including assistance about safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, alliances, and training and education. An overall commitment to workplace safety and health can add value to your business, your workplace, and your life.

Establishing a safety and health management system

Working in a safe and healthful environment can stimulate innovation and creativity and result in increased performance and higher productivity. The key to a safe and healthful work environment is a comprehensive safety and health management system.

OSHA has electronic compliance assistance tools, or eTools, on its website that walks users through the steps required to develop a comprehensive safety and health program. The eTools are posted at www.osha.gov, and are based on guidelines that identify four general elements critical to a successful safety and health management system:

- Management leadership and employee involvement,
- Worksite analysis,
- Hazard prevention and control, and
- Safety and health training.

State programs

The Occupational Safety and Health Act of 1970 (OSH Act) encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans and funds up to 50 percent of each program's operating costs. State plans must provide standards and enforcement programs, as well as voluntary compliance activities, that are at least as effective as federal OSHA's.

Currently, 26 states and territories have their own plans. Twenty-three cover both private and public (state and local government) employees and three states, Connecticut, New Jersey, and New York, cover only the public sector. For more information on state plans, visit www.osha.gov.

Consultation assistance

Consultation assistance is available on request to employers who want help establishing and maintaining a safe and healthful workplace. Funded largely by OSHA, the service is provided at no cost to small employers and is delivered by state authorities through professional safety and health consultants.

Safety and Health Achievement Recognition Program

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards, and

developing an effective safety and health management system.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for 1 year initially, or 2 years upon renewal. For more information about consultation assistance, visit www.osha.gov.

Voluntary Protection Programs

Voluntary Protection Programs (VPP) are designed to recognize outstanding achievements by companies that have developed and implemented effective safety and health management programs. There are three VPP programs: Star, Merit, and Demonstration. All are designed to

- Recognize employers who that have successfully developed and implemented effective and comprehensive safety and health management programs;
- Encourage these employers to continuously improve their safety and health management programs;
- Motivate other employers to achieve excellent safety and health results in the same outstanding way; and
- Establish a cooperative relationship between employers, employees, and OSHA.

VPP participation can bring many benefits to employers and employees, including fewer worker fatalities, injuries, and illnesses; lost-workday case rates generally 50 percent below industry averages; and lower workers' compensation and other injury- and illness-related costs. In addition, many VPP sites report improved employee motivation to work safely, leading to a better quality of life at work; positive community recognition and interaction; further improvement and revitalization of already-good safety and health programs; and a positive relationship with OSHA.

Additional information on VPP is available from OSHA regional offices listed at the end of this booklet. Also, see "Cooperative Programs" on OSHA's website.

Cooperative partnerships

OSHA has learned firsthand that voluntary, cooperative partnerships with employers, employees, and unions can be a useful alternative to traditional enforcement and an effective way to reduce worker deaths, injuries, and illnesses. This is especially true when a partnership leads to the development and implementation of a comprehensive workplace safety and health management system.

Alliance program

Alliances enable organizations committed to workplace safety and health to collaborate with OSHA to prevent injuries and illnesses in the workplace. OSHA and its allies work together to reach out to, educate, and lead the nation's employers and their employees in improving and advancing workplace safety and health.

Alliances are open to all, including trade or professional organizations, businesses, labor organizations, educational institutions, and government agencies. In some cases, organizations may be building on existing relationships with OSHA through other cooperative programs.

There are few formal program requirements for Alliances, which are less structured than other cooperative agreements, and the agreements do not include an enforcement component. However, OSHA and the participating organizations must define, implement, and meet a set of short- and long-term goals that fall into three categories: training and education; outreach and communication; and promotion of the national dialogue on workplace safety and health.

Strategic Partnership Program

OSHA Strategic Partnerships are agreements among labor, management, and government to improve workplace safety and health. These partnerships encourage, assist, and recognize the efforts of the partners to

eliminate serious workplace hazards and achieve a high level of worker safety and health. Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships build cooperative relationships with groups of employers and employees.

For more information about this program, contact your nearest OSHA office or visit our website.

Occupational safety and health training

The OSHA Training Institute in Arlington Heights, Ill., provides basic and advanced training and education in safety and health for federal and state compliance officers, state consultants, other federal agency personnel, and private-sector employers, employees, and their representatives.

In addition, 20 OSHA Training Institute Education Centers at 35 locations throughout the United States deliver courses on OSHA standards and occupational safety and health issues to thousands of students a year.

Training grants

OSHA awards grants to nonprofit organizations to provide safety and health training and education to employers and workers in the workplace. Grants often focus on high-risk activities or hazards or may help nonprofit organizations in training, education, and outreach.

OSHA expects each grantee to develop a program that addresses a safety and health topic named by OSHA, recruit workers and employers for the training, and conduct the training. Grantees are also expected to follow up with students to find out how they applied the training in their workplaces.

For more information on training or grants, contact OSHA Office of Training and Education, 2020 Arlington Heights Rd., Arlington Heights, IL 60005; or call (847) 297-4810.

Other assistance materials

OSHA has a variety of materials and tools on its website at www.osha.gov. These include eTools such as Expert Advisors and Electronic Compliance Assistance Tools, information on specific health and safety topics, regulations, directives, publications, videos, and other information for employers and employees.

OSHA also has an extensive publications program. For a list of items, visit OSHA's website at www.osha.gov or contact the OSHA Publications Office, U.S. Department of Labor, 200 Constitution Avenue, NW, N-3101, Washington, DC 20210. Telephone (202) 693-1888 or fax to (202) 693-2498.

SELF CHECKLIST & TOOL BOX TALKS

**Small Business Safety and Health Management Series
OSHA 2209-02R 2005**

SELF-INSPECTION

The most widely accepted way to identify hazards is to conduct safety and health inspections because the only way to be certain of an actual situation is to look at it directly from time to time.

Begin a program of self-inspection in your own workplace. Self-inspection is essential if you are to know where probable hazards exist and whether they are under control.

This section includes checklists designed to assist you in self-inspection fact-finding. The checklists can give you some indication of where to begin taking action to make your business safer and more healthful for all of your employees. **These checklists are by no means all-inclusive** and not all of the checklists will apply to your business. You might want to start by selecting the areas that are most critical to your business, then expanding your self-inspection checklists over time to fully cover all areas that pertain to your business. Remember that a checklist is a tool to help, not a definitive statement of what is mandatory. Use checklists only for guidance.

Don't spend time with items that have no application to your business. Make sure that each item is seen by you or your designee and leave nothing to memory or chance. Write down what you see or don't see and what you think you should do about it.

Add information from your completed checklists to injury information, employee information, and process and equipment information to build a foundation to help you determine what problems exist. Then, as you use the OSHA standards in your problem-solving process, it will be easier for you to determine the actions needed to solve these problems.

Once the hazards have been identified, institute the control procedures described at page 9 and establish your four-point safety and health program.

Self-Inspection Scope

Your self-inspections should cover safety and health issues in the following areas:

- **Processing, Receiving, Shipping and Storage** - equipment, job planning, layout, heights, floor loads, projection of materials, material handling and storage methods, training for material handling equipment.
- **Building and Grounds Conditions** - floors, walls, ceilings, exits, stairs, walkways, ramps, platforms, driveways, aisles.
- **Housekeeping Program** - waste disposal, tools, objects, materials, leakage and spillage, cleaning methods, schedules, work areas, remote areas, storage areas.
- **Electricity** - equipment, switches, breakers, fuses, switch-boxes, junctions, special fixtures, circuits, insulation, extensions, tools, motors, grounding, national electric code compliance.
- **Lighting** - type, intensity, controls, conditions, diffusion, location, glare and shadow control.
- **Heating and Ventilation** - type, effectiveness, temperature, humidity, controls, natural and artificial ventilation and exhausting.
- **Machinery** - points of operation, flywheels, gears, shafts, pulleys, key ways, belts, couplings, sprockets, chains, frames, controls, lighting for tools and equipment, brakes, exhausting, feeding, oiling, adjusting, maintenance, lockout/tagout, grounding, work space, location, purchasing standards.
- **Personnel** - training, including hazard identification training; experience; methods of checking machines before use; type of clothing; PPE; use of guards; tool storage; work practices; methods for cleaning, oiling, or adjusting machinery.
- **Hand and Power Tools** - purchasing standards, inspection, storage, repair, types, maintenance, grounding, use and handling.

