Pre-Operational Inspection of Equipment Stats and Facts – Spanish

HECHOS

Las razones por las que los equipos fallan y provocan accidentes son, entre otras, las siguientes

1. **Desgaste.** Las piezas de la maquinaria y las herramientas se desgastan con el tiempo debido a su uso constante. En algún momento, deben ser reemplazadas debido al desgaste.
2. **Diseño o fabricación defectuosos.** En algunos casos, la maquinaria, los equipos o las herramientas fueron diseñados o fabricados de forma incorrecta.
3. **Falta de capacitación.** Los trabajadores deben ser capacitados en el uso seguro de equipos pesados, como carretillas elevadoras, bulldozers y otras máquinas y equipos pesados, antes de utilizarlos en el trabajo.
4. **Mantenimiento inadecuado.** Los empleadores tienen la obligación de inspeccionar, reparar y reemplazar la maquinaria, el equipo y las herramientas de forma regular.
5. **Error del operario.** Muchos accidentes ocurren cuando los operadores de equipos y maquinaria cometen errores o realizan acciones negligentes.
6. **Negligencia de terceros.** En algunos casos, un tercero, como un subcontratista o proveedor, puede haber proporcionado la maquinaria, operarla o mantenerla y causar un accidente por negligencia.
7. **La maquinaria pesada** está muy extendida en la construcción, la minería, la fabricación y el almacenamiento. Los estudios demuestran que los accidentes laborales en los que está implicada la maquinaria pesada suponen un porcentaje importante de las lesiones graves y de las muertes.

ESTADÍSTICAS

- En 2016, el contacto con equipos y objetos fue una de las seis principales causas de muerte de los trabajadores, y ser golpeado o quedar atrapado entre maquinaria y equipos es una de las “cuatro causas fatales” de las muertes de los trabajadores de la construcción.
- Las lesiones graves no mortales derivadas de que los trabajadores queden atrapados en la maquinaria ascendieron a 34.000 y fueron la principal causa de amputaciones entre los trabajadores asalariados de la industria privada.
- La industria manufacturera, que por lo general hace un uso intensivo de maquinaria, fue la que más muertes (41%) causó como consecuencia de que los trabajadores quedaran atrapados en la maquinaria.
- Según la Administración de Seguridad y Salud en el Trabajo (OSHA) y la Oficina de Estadísticas Laborales, los accidentes con maquinaria son responsables de más de 800 muertes y aproximadamente 18.000 amputaciones, lesiones por aplastamiento, laceraciones y abrasiones cada año en Estados Unidos.

Pre-Operational Inspection of Equipment Fatality File

According to CBS Boston, a 47-year-old man was killed while on the job after his equipment fails during an inspection of a city water tank in Braintree, Massachusetts, on Thursday.

David Scott, 47, was performing an inspection inside of a 150-foot municipal water tank when tragedy struck. At around 10:00 a.m. local time, Scott reported an air supply issue to his spotter on top of the tank. As the crew waited for rescue personnel to arrive, the spotter jumped into the tank in an effort to save

Scott.

However, due to the frigid weather conditions and the cold water, the spotter became trapped in the 45-degree water as well. According to CBS Boston, rescue crews were able to pull the spotter from the tank, who was numb and cold with little strength. The man was transported to the hospital and treated for injuries including hypothermia.

CBS Boston reports that crews were unable to save Scott, who passed away inside the tank. Crews decided to drain the one-million gallon tank to recover his body, an effort that took around 16 hours.

Scott, the spotter, and another crew member on the ground were part of T.K. Potable Diving of Texas, subcontractors hired by Pittsburg Tank & Tower Co., who the Town of Braintree have on retainer. CBS Boston reports that the latter organization had only one previous "serious" safety violation in the past 10 years.

Investigators from the Occupational Safety and Health Administration (OSHA) were on the scene. City officials say there is no threat to the municipal water supply as a result of the accident.

Pre-Operational Inspection of Equipment Fatality File – Spanish

Según la cadena de televisión CBS Boston, un hombre de 47 años murió mientras trabajaba después de que su equipo fallara durante una inspección de un tanque de agua de la ciudad en Braintree, Massachusetts, el jueves.

David Scott, de 47 años, estaba realizando una inspección en el interior de un depósito de agua municipal de 150 pies cuando se produjo la tragedia. Alrededor de las 10 de la mañana, hora local, Scott informó a su observador de un problema de suministro de aire en la parte superior del tanque. Mientras la tripulación esperaba la llegada del personal de rescate, el observador saltó al interior del tanque para salvar a Scott.

Sin embargo, debido a las gélidas condiciones meteorológicas y al agua fría, el observador también quedó atrapado en el agua a 45 grados. Según la CBS Boston, los equipos de rescate pudieron sacar del tanque al observador, que estaba entumecido y tenía poca fuerza. El hombre fue trasladado al hospital y tratado por lesiones que incluían hipotermia.

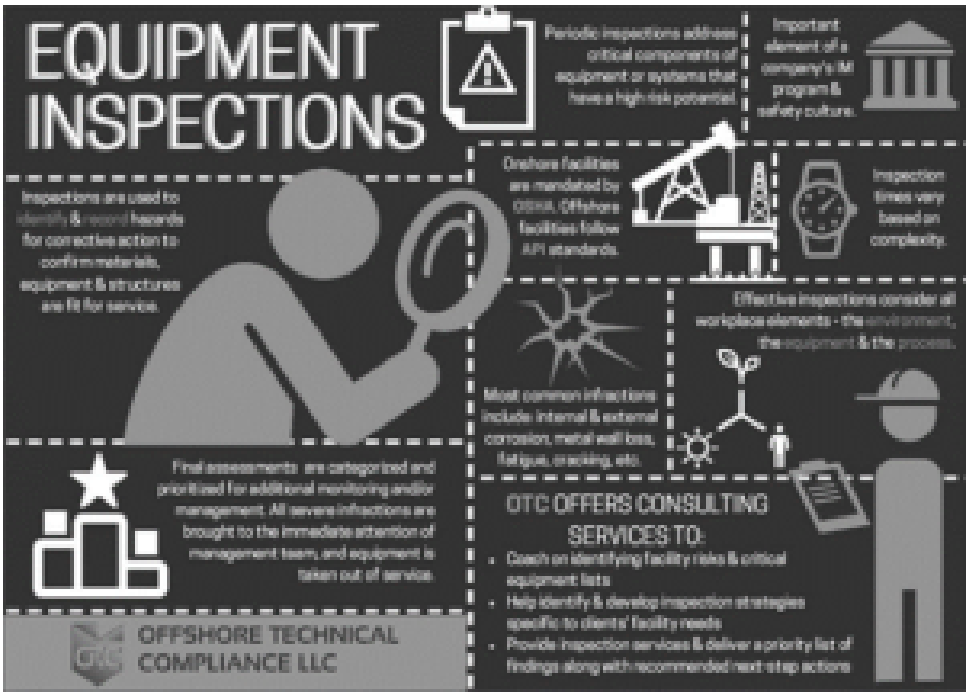
CBS Boston informa de que los equipos no pudieron salvar a Scott, que falleció dentro del tanque. Los equipos decidieron vaciar el tanque de un millón de galones para recuperar su cuerpo, un esfuerzo que duró unas 16 horas.

Scott, el observador y otro miembro de la tripulación en tierra formaban parte de la empresa T.K. Potable Diving of Texas, subcontratistas contratados por Pittsburg Tank & Tower Co., que la ciudad de Braintree tiene contratada. CBS Boston informa de que esta última organización sólo había cometido una infracción de seguridad “grave” en los últimos 10 años.

Los investigadores de la Administración de Seguridad y Salud Ocupacional (OSHA) estaban en el lugar. Los funcionarios de la ciudad afirman que el accidente no supone una amenaza para el suministro municipal de agua.

Pre-Operational Inspection of

Equipment Picture This



Source: *https://otcompliance.com*

Pre-Operational Inspection of Equipment Picture This – Spanish



Fuente: *https://charlasdeseguridad.com.ar/*

Chain Saw Safety – Quick Tips

Chain saws are one of the most widely used power tools at home and in the workplace. They also have the potential to be among the most lethal. Whether it be the weekend warrior cutting firewood or a professional logger clearing land, proper personal protective equipment (PPE), training and technique are the keys to preventing injuries

Most chain saw injuries involve contact with the cutting chain, which results in severe injury to the hands, legs, feet and head. Preventing such injuries in the workplace requires a joint effort on the part of both employee and employer. Employees should use proper personal protective equipment, chain saws with the latest

safety equipment and proper techniques when cutting. Employers must provide chain saw safety training and supervision.

Chain Saw Safety Training and Supervision

Chain saw operators must receive training. The most effective training includes a combination of classroom and hands-on instruction. Depending on the experience of the chain saw operator, training should include instruction on:

- safe working techniques
- basic information about the chain saw, components, design and limitations
- stopping and starting
- cleaning and servicing
- kick back prevention
- chain sharpening
- PPE use and limitations

General Chain Saw Safety Precautions

Before using a chain saw it is important to read the owners manual and familiarize yourself with safe operation. Giving a chain saw to an inexperienced worker without proper training is an injury waiting to happen. Before each use, check that:

- chain saw is in good general condition (no leaks or damage)
- the throttle, safety throttle lock and stop switch operate correctly
- the chain brake works
- the chain is lubricated, sharp and tensioned correctly
- the sprocket and bar are in good condition
- the idle is properly adjusted

When starting a chain saw, it should always be started on the ground or a well supported and stable surface. Drop starting a chain saw is dangerous and prohibited by OSHA. A drop start is done by thrusting the saw down with your left hand and pulling the starter cord up with your right hand.

When refueling a chain saw:

- avoid smoking
- be at least 10 ft (3m) from any open flame or other ignition source
- choose a clean area
- refuel only after the motor has cooled
- wipe off any fuel that spilled on to the saw
- use safety cans to store fuel
- keep a fire extinguisher or shovel nearby

The chain saw must be shut down whenever a saw is carried. Whenever possible use the bar cover. A saw should be carried by its front handle with the chain bar pointing to the rear. Do not carry the chain saw on your shoulder. If you lose your balance, you will not be able to use your arm to break your fall. After completing work, the following maintenance needs to be completed:

- clean the saw, especially the air filter, cooling inlets and sprocket
- reverse chain bar, top to bottom, to prevent wear and burring
- clean chain brake
- clean out chain bar groove
- sharpen saw chain

Chain Saw Kickback

Kickback occurs when the upper portion of the tip comes in contact with another object or the chain is pinched in a cut. As a result the chain saw will violently jump or kick back towards the operator. To prevent kickback injury the following precautions should be taken:

- buy chain saws with or install chain brake (preferably inertia activated)
- check brake mechanism before each use for effective operation
- use a low kickback chain (meets American National Standards Institute B175.1-1991 Safety Requirements for Gasoline Powered Saws)
- sharpen the saw chain frequently; a sharp saw chain is safer

than a dull one (if wood shavings become dusty the chain is dull and needs to be sharpened)
- hold chain saw firmly
- check chain tension
- never bend over the saw, if you stand up straight and to the left of the bar any kickback should go over your right shoulder
- wear protective equipment -especially head protection and chain saw chaps or leggings
- don't cut above shoulder height
- never hold saw with one hand or by one handle
- always begin the cut at peak revs
- clear brush and debris from area

PPE Selection and Use

To minimize injury, workers need proper safety equipment. *(29 CFR 1910.266)* The equipment listed below must be worn at all times during chain saw activities:

Hand Protection – Hand protection, which provides adequate protection from puncture wounds, cuts and lacerations must be provided. *(29 CFR 1910.266 (d)(1)(iii))*

Hard Hat – All hard hats must meet ANSI standards Z89.1-1989 or Z89.2-1971 for impact protection. High visibility colors are suggested. *(29 CFR 1910 Subpart I)*

Safety Glasses and Face Shields – Safety glasses are considered to be primary protection and must be worn when eye injury is possible. Proper safety eyewear will meet ANSI Z87.1-1989. Face shields may be worn to protect the face from wood chips and other small objects. However, face shields are secondary protection and safety glasses or goggles (primary protection) must be worn. *(29 CFR 1910.266 (d)(1)(vii)(A)&(B))*

Hearing Protection – There are many types of hearing protection, such as foam plugs, ear muffs and hearing bands. All the different types provide excellent hearing protection. When choosing hearing protection, you should look for the NRR (Noise Reduction Rating).

This number refers to the amount of noise the hearing protection will reduce the surrounding work environment. In general, the higher the NRR the better. The type of hearing protection (ear plug, ear muff or ear cap) that works best depends upon the preference of the worker.

Leg Protection – To prevent injury to the legs, special chaps or leggings should be worn. The most common types are made of Kevlar™ or ballistic nylon. When choosing protective clothing, look for equipment which meets American Pulpwood Association (APA) guidelines. *(29 CFR 1910.266 (d)(1)(iv))*

Safety Footwear – When choosing proper footwear make sure the footwear is Z41-1991 compliant. Shoes that meet this standard have been tested for both impact and compression resistance. In addition, footwear may also provide special protective qualities such as being conductive, metatarsal protection, electrical hazard protection or puncture resistance. All footwear meeting the ANSI specifications will be marked with what portion of the standard it complies with. In addition, American Society for Testing and Materials (ASTM) has recently published F1818, Standard Specifications for Foot Protection for Chain Saw Users. This standard has specific criteria for footwear intended to minimize foot injuries caused by accidental contact with a running chain saw. *(29 CFR 1910.266 (d)(1)(v))*

First Aid – First-aid kits should be provided at each worksite where trees are being cut, at each active landing and on each employee transport vehicle. Among the criteria is that each kit should be based on the number of employees and the hazards anticipated. *(29 CFR 1910.266 (d)(2)(i))*

Sources

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Source: Grainger Know How – https://www.grainger.com/know-how

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Emergency Spill Response – Quick Tips

Emergency spill response is an important part of a company's safety, health and environmental program. Well-prepared companies have a plan of action and keep the appropriate cleanup supplies on hand.

OSHA's Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) includes all employees who are exposed or potentially exposed to hazardous substances – including hazardous waste – and who are engaged in one of the following operations as specified by 29 Code of Federal Regulations (CFR) 1910.120(a)(1)(i-

v) and 1926.65(a)(1)(i-v):

- Cleanup operations required by a governmental body, whether federal, state, local or other, involving hazardous substances that are conducted at uncontrolled hazardous waste sites
- Corrective actions involving cleanup operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C. 6901 et seq.)
- Voluntary cleanup operations at sites recognized by a federal, state, local or other governmental body as uncontrolled hazardous waste sites
- Operations involving hazardous wastes that are conducted at treatment, storage and disposal facilities regulated by Title 40 CFR Parts 264 and 265 pursuant to RCRA, or by agencies under agreement with U.S. Environmental Protection Agency to implement RCRA regulations
- Emergency response operations for releases of, or substantial threats of releases of, hazardous substances regardless of the location of the hazard

This document focuses on emergency response operations for releases or potential releases of hazardous substances regardless of the location of the hazard by HAZWOPER trained responders. A simplified spill response plan might look like this:

1. Evacuate personnel from the immediate area of the spill
2. Identify the spilled material(s)
3. Notify the spill response team
4. Barricade the spill area and notify others in surrounding areas
5. Extinguish or disconnect all sources of ignition and contact the fire department if the chemical is flammable
6. Don the appropriate personal protective equipment
7. Contain the spill
8. Clean up the spill
9. Dispose of the spill in accordance with local, state and federal regulations

When putting together spill containment supplies, anticipate the

types of spills and consider the types and styles of sorbents needed as well as the “tools” that should be readily available. Spill containment tools can include drain protectors, drain plugs, drum plugs, chemical neutralizers and shovels, brooms, mops, etc. If working with flammables, non-sparking tools are suggested.

Sorbent Forms

Booms are cylindrical and vary in length and width. They are used to help control and contain spills. Some booms contain spills on water, and can be connected together and deployed onto the water as a large spill barrier.

Socks or mini booms are cylindrical and vary in length and width. This form of sorbent is typically used in facility spill response or maintenance applications. Socks can be used to contain spills or can be placed around machinery or other equipment to contain leaks.

Pillows are rectangular and filled with sorbent media. They are used to clean up medium-sized spills. They can be placed under drip pans to help eliminate overflow problems, or used as a precaution for a possible spill when transferring liquids.

Pads and sorbent rolls are flat, sorbent sheets available in unperforated rolls, perforated rolls or manufactured to a specific size, up to 300 feet long. Pads can be used to line shelves, catch leaks under machinery and clean up spills. Rolls can be cut to specific lengths for larger applications.

Loose or particulate sorbents are composed of sorbent media that is not contained in any type of skin. Application of loose sorbents depends on the type of sorbent media used. Loose sorbents are typically used on small spills.

Sorbent Categories

The three categories of sorbents are universal, petroleum and maintenance. These categories are made up of several sorbent materials, including synthetics, such as polypropylene; inorganic materials, such as expanded silicates and clay; and organic

materials, such as cellulose and wood fibers.

Universal sorbents are designed to absorb any liquid. They will absorb aggressive liquids, such as acids and bases as well as non-aggressive liquids and solvents, such as cleaners, water-based fluids, gasoline and alcohols. Universal sorbents are made of surfactant-treated polypropylene or expanded silicate materials. When cleaning up hydrofluoric acid, do not use an expanded silicate absorbent because the expanded silicate material will react with the hydrofluoric acid and generate heat. Instead, use a sorbent made of polypropylene.

Petroleum sorbents or “oil-only sorbents” are designed for absorption of oil and/or petroleum-based liquids. These sorbents are hydrophobic, meaning they will not absorb water or water-based liquids. These can be deployed on water surfaces for emergency cleanup of spills, or used in maintenance applications for hydraulic and engine-oil cleanup. Petroleum sorbents are made of polypropylene or treated cellulose.

Maintenance sorbents absorb non-aggressive liquids commonly found in manufacturing/maintenance operations. These liquids include coolants, lubricants, oils and cutting fluids. Maintenance sorbents will pick up both water-based and oil-based fluids. These sorbents are typically made of recycled materials, such as cotton, wool, cellulose or corncob. They can also be made of polypropylene or a combination of the materials listed above.

Sorbent Capacity

Sorbent capacity can be listed by the amount of weight absorbed in relation to itself (e.g., absorbs 12 times its weight) or by its liquid capacity (e.g., absorbs 8 gallons). If a boom weighs 1 pound and absorbs 12 times its weight, it will absorb 12 pounds of fluid. However, since all liquids don’t weigh the same per gallon, the weight capacity of the sorbent actually varies from liquid to liquid. So perhaps a more accurate way to assess sorbent capacity is by how many gallons it will absorb, or its liquid capacity. This amount will remain fairly static, regardless of the fluid weight. A boom that’s 4 feet long and 3 inches in diameter will

typically absorb 1 to 1.25 gallons of liquid. A pad that measures 16 inches by 20 inches and is 3/16ths of an inch thick will absorb 28 to 32 fluid ounces. Both of these examples are for polypropylene sorbents. Other materials may have different sorbent capacities.

Sources

29 CFR 1910.120, Hazardous Waste Operations and Emergency Response

U.S. EPA National Response Center

Frequently Asked Questions

Q: Are there specific training requirements for personnel who respond to spills?

A: Yes. These requirements are found in three areas of 29 CFR 1910.120:

- 29 CFR 1910.120(e)(1) through (e)(9) describes in detail the training requirements for all employees exposed on site to hazardous substances, health hazards, or safety hazards. Training is broken down into general, initial, management and supervisor, qualifications, certifications, emergency response and refresher training.
- Training for work at treatment, storage and disposal facilities is described in 29 CFR 1910.120(p)(7)(i) through (p)(7)(iii) – 24 hours of initial training and eight hours of annual retraining are required.
- Emergency responder training to hazardous substance releases is covered under 29 CFR 1910.120(q)(6) through (q)(8)(ii). There are five levels of training, and the levels are progressive.

Q: How should I properly dispose of sorbents that are saturated with chemicals?

A: The handling, storage and disposal of these materials are governed by local, state and/or federal environmental regulations. Section 13 of the safety data sheet (SDS) can be referenced for

disposal considerations. It is the end user's responsibility to comply with the respective regulations.

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Source: Grainger Know How – https://www.grainger.com/know-how

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Containment and Secondary Containment Requirements – Quick Tips

Introduction

The Environmental Protection Agency (EPA) addresses containment and secondary containment systems in the Resource Conservation and Recovery Act (RCRA) found in Title 40 Code of Federal Regulations (CFR) Part 264.

The EPA refers to the need for containment and secondary containment in two different areas. Subpart I, Use and Management of Containers (40 CFR 264.175), which covers portable storage containers, such as 55-gallon drums, for hazardous waste, and the second in Subpart J, Tank Systems (40 CFR 264.193), which covers

large stationary containers, such as tank systems, for hazardous waste.

Hazardous Materials and Hazardous Wastes

According to the Institute of Hazardous Materials Management a hazardous material is any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.

Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the EPA, Occupational Safety and Health Administration (OSHA), Department of Transportation (DOT), and Nuclear Regulatory Commission (NRC). Each has its own definition. OSHA defines a hazardous chemical as any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified. EPA incorporates the OSHA definition, and adds any item or chemical which can cause harm to people, plants, or animals when released by:

- Spilling,
- Leaking,
- Pumping,
- Pouring,
- Emitting,
- Emptying,
- Discharging,
- Injecting,
- Escaping,
- Leaching,
- Dumping, or
- Disposing into the environment.

EPA: Portable Containers

The EPA does not use the term “secondary containment” when addressing portable containers. Instead, they refer only to containment under 40 CFR 264.175(b). It says that a containment

system must be designed and operated as follows:

1. A base must underlie the containers which is free of cracks or gaps and is sufficiently impervious to contain leaks, spills and accumulated precipitation until the collected material is detected and removed.
2. The base must be sloped or the containment system must be otherwise designed and operated to drain and remove liquids resulting from leaks, spills or precipitation, unless the containers are elevated or are otherwise protected from contact with accumulated liquids.
3. The containment system must have sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be considered in this determination.
4. Run-on into the containment system must be prevented unless the collection system has sufficient excess capacity to contain any run-on which might enter the system. Excess capacity must be in addition to the 10% of the volume of containers or the volume of the largest container, whichever is greater.
5. Spilled or leaked waste and accumulated precipitation must be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system.

Under 40 CFR 264.175(c), the EPA also addresses storage areas that store containers holding only wastes that do not contain free liquids and sets the following provisions for the storage areas:

1. The storage area must be sloped or otherwise designed and operated to drain and remove liquid resulting from precipitation, or
2. The containers must be elevated or otherwise protected from contact with accumulated liquid.

There are certain wastes for which a storage area alone will not suffice. These waste streams are listed under 40 CFR 264.175(d) and require a containment system in addition to the storage area.

EPA: Tank Systems

The EPA specifies under 40 CFR 264.193(b) that secondary containment systems are required to prevent any migration of wastes or accumulated liquid out of the system to the soil, ground water or surface water during the use of the tank system. Minimum requirements of how the system must be constructed are listed in 40 CFR 264.193(c) and include:

1. Constructed of or lined with materials that are compatible with the wastes to be placed in the tank system and must have sufficient strength and thickness to prevent failure owing to pressure gradients (including static head and external hydrological forces), physical contact with the waste to which it is exposed, climatic conditions and the stress of daily operation (including stresses from nearby vehicular traffic).
2. Placed on a foundation or base capable of providing support to the secondary containment system, resistance to pressure gradients above and below the system and capable of preventing failure due to settlement, compression or uplift.
3. Provided with a leak-detection system that is designed and operated so that it will detect the failure of either the primary or secondary containment structure or the presence of any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours, or at the earliest practicable time if the owner or operator can demonstrate that existing detection technologies or site conditions will not allow detection of a release within 24 hours.
4. Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills or precipitation. Spilled or leaked waste and accumulated precipitation must be removed from the secondary containment system within 24 hours, or in as timely a manner as possible to prevent harm to human health and the environment if the owner or operator can demonstrate that removal of the released waste or accumulated precipitation cannot be accomplished within 24 hours.

Along with the above requirements, a provision has been made that requires that one or more of the following devices also be implemented:

1. A liner (external to the tank)
2. A vault
3. A double-walled tank; or
4. An equivalent approved device

These four devices need to meet the stringent specifications spelled out in 40 CFR 264.193(e). For example, an external liner must be:

1. Designed or operated to contain 100% of the capacity of the largest tank within its boundary;
2. Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient to contain precipitation from a 25-year, 24-hour rainfall event.
3. Free of cracks or gaps; and
4. Designed and installed to surround the tank completely and to cover all surroundings likely to come into contact with the waste if the waste is released from the tank(s) (i.e., capable of preventing lateral as well as vertical migration of the waste).

Uniform Fire Code and International Fire Code

Facilities that store hazardous materials may also be required to meet either the Uniform Fire Code (UFC) or International Fire Code (IFC). If you have questions regarding compliance with either the UFC or IFC standards, consult with your Authority Having Jurisdiction (AHJ) – normally your local fire marshal. When referring to the UFC you need to clarify with the AHJ, which fire code release needs to be applied to achieve compliance. Some states and municipalities have adopted the UFC from the National Fire Protection Association (NFPA), also known as NFPA 1. Others have adopted the UFC released by the International Conference of

Building Officials (ICBO). Since the creation of the International Code Council (ICC) in 1994, the UFC is no longer maintained (last release in 1997). It has been superseded by the subsequent releases of the IFC published by ICC. In the past several attempts to merge these two widely used model codes were unsuccessful.

Choosing a Containment System

When selecting a containment system for an application, many issues need to be considered. A list of issues and some things to contemplate are listed below.

1. Is the system chemically compatible with the products being stored?
    - . Containment system sumps are primarily constructed of one or two materials: high-density polyethylene or steel.

1. Skids usually have material choices for grids or platforms. The choice of material depends on chemical resistance as well as disposability of the product. Examples include:
    - . Wood platforms: Once contaminated, they are disposed of according to local regulations.

1. Fiberglass grids: Compatible with a wide variety of chemicals, but not suitable for corrosive materials.
2. Polyethylene grids: Compatible with a wide variety of chemicals including many corrosive materials.

2. How will the system be monitored and cleaned?
    - . Most units have drains. If they don’t, usually a spill cleanup kit will be adequate to clean up the internal sump area of the system.
3. What volume and weight of the containers will be stored?
    - . According to federal codes, a containment system must have a sufficient capacity to contain 10% of the volume of the containers or the volume of the largest container, whichever is greater. Some states may have more stringent restrictions and you should contact your AHJ for your local requirement.

1. Containment systems are commonly rated with a static weight capacity. This is a weight in a stationary mode.

4. How often will the containment system be moved? How will it be moved?
    - . Portable containment units are intended to be moved without containers on them. This is the safest mode of transport. The containers can be replaced once the containment system has reached its destination.

1. Most portable containment systems are constructed with fork pockets. These are designed to accept and be moved by forklifts or pallet jacks.

5. How will the containers be loaded onto the system?
    - . Ramps that accommodate containment systems are the easiest way to load a system. Low-profile containment systems have also been developed to address the loading issues.
6. How many containers will be loaded on the system?
    - . Portable containment systems range from accommodating four 5-gallon pails to one 55-gallon drum to whole-room containment systems for drums. Make sure when dealing with flammable products and the larger containment systems that your local fire codes are met. There are restrictions for quantities of flammable products that can be stored in one area depending on the class of the flammable product.
7. Are any of the products being stored considered flammable?
    - . Special provisions need to be taken into account, such as grounding and bonding and the amount of flammable product being stored in one area. Check your local codes for these specifications.
8. What are the state and local codes for secondary containment in your area?
    - . A listing of the regional EPA offices can be found on EPA website. Phone numbers of divisions that deal with secondary containment are listed. The regional office can refer to state EPA agencies that can explain state codes. Another source for secondary

containment requirements is your AHJ.

Frequently Asked Questions

Q: What are free liquids?

A: Free liquids are liquids that readily separate from the solid portion of a waste under ambient temperature and pressure.

Q: What does "10% of the volume of the containers, or the volume of the largest container, whichever is greater" mean?

A: As an example, consider storing four 55-gallon drums:

- Four drums x 55 gallons per drum = 220 gallons
- 10% of all = 10% of 220 gallons = 22 gallons

OR

- Volume of the largest container = 55 gallons

In this case, you would need 55 gallons of containment capacity.

Sources

Environmental Protection Agency Use and Management of Containers
Environmental Protection Agency Tank Systems
Institute of Hazardous Materials Management
Occupational Safety and Health Administration Hazard Communication Standard

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Trenching and Excavation Standards – Quick Tips

OSHA recognizes excavating as one of the most hazardous activities of a construction operation. OSHA revised Subpart P-Excavations, of 29 CFR 1926.650, .651, and .652 to make the standard easier to understand, permit the use of performance criteria where possible, and provide construction employers with options when classifying soil and selecting employee protection methods.

Excavating and trenching are defined as two separate items within the OSHA regulations. Excavating is any man-made cut, cavity, trench or depression in an earth surface formed by earth removal. Trenching is defined as a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less (measured at the bottom of the excavation), the excavation is also considered a trench.

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. The designated competent person shall be able to demonstrate the following:

1. Training, experience and knowledge of:
    - Soil analysis

    - Use of protective systems
    - Requirements of 29 CFR Part 1926, Subpart P
2. Ability to detect:
    - Conditions that could result in cave-ins
    - Failures in protective systems
    - Hazardous atmospheres
    - Other hazards including those associated with confined spaces
3. Authority to take prompt corrective measures to eliminate existing and predictable hazards and stop work when required.

An inspection shall be conducted and documented 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. The following list specifies the frequency and conditions requiring inspections:

- Daily and before the start of each shift
- As dictated by the work being done in the trench
- After every rainstorm
- After other events that could increase hazards, e.g. snowstorm, windstorm, thaw, earthquake, etc.
- When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom or other similar conditions occur
- When there is a change in the size, location or placement of the spoil pile
- When there is any indication of change or movement in adjacent structures

Where a competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Trenches of 4-foot or more in depth should be provided with a

fixed means of egress. Spacing between ladders or other means of egress must be such that a worker will not have to travel more than 25-feet laterally to the nearest means of egress. Ladders must be secured and extend a minimum of 36-inches above the landing. Metal ladders should be used with caution, particularly when electric utilities are present.

OSHA categorizes soil and rock deposits into four types as follows:

1. **Stable rock** is a natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed. Most of the time it is identified by a rock name such as granite or sandstone. Determining if a deposit is of this type may be difficult unless it is known whether cracks exist and whether or not the cracks run into or away from the excavation.
2. **Type A soils** are cohesive soils with an unconfined compressive strength of 1.5 tons per square foot or greater. These types of soils are often clay, silt clay, sandy clay, clay loam and in certain cases, silty clay loam and sandy clay loam.
3. **Type B soils** are cohesive soils with an unconfined compressive strength greater than 0.5, but less than 1.5 tons per square foot. Examples of types of soils within this category are angular gravel silt, silt loam and/or previously disturbed soils unless otherwise classified as type C soil.
4. **Type C soils** are cohesive soils with an unconfined compressive strength of 0.5 tons per square foot or less. Granular soils like gravel, sand and loamy sand, submerged soil, soil form which water is freely seeping and submerged rock that is not stable fall into the type C soil category.
5. **Layered geological strata** are soils that are configured in layers of several different soil types/categories. This type of soil condition must be classified on the basis of the soil type within the various layers that is the weakest of the soil type/layers. Each layer may be classified individually if a more stable layer lies below the less

stable layer, eg., where a type C soil rests on top of stable rock.

The OSHA regulation identifies the following types of test equipment and several methods to be used for evaluation of soil types:

1. Pocket Penetrometers are a direct reading, spring-operated instruments used to determine the unconfined compressive strength of saturated cohesive soils. Once pushed into the soil, an indicator sleeve displays the reading. This type of instrument reads out in either tons per square foot or kilograms per square centimeter.
2. Plasticity or wet thread test is conducted by molding a moist sample of the soil into a ball and attempting to roll it into a thin thread, approximately 1/8-inch diameter by 2 inches in length. The soil sample is held by one end. If the sample does not break or tear, the soil is considered cohesive.
3. Visual test is a qualitative evaluation of conditions around the site. In a visual test, the entire excavation site is observed, including the soil adjacent to the site and the soil being excavated. If the soil remains in clumps, it is cohesive; if it appears to be coarse-grained sand or gravel, it is considered granular. The evaluator shall also check for any signs of vibration.

During a visual test, the evaluator should check for crack-line openings along failure zones that would potentially indicate tension cracks. Evaluator should also look for existing utilities that indicate that the soil has previously been disturbed, and observe the open side of the excavation for indications of layered geologic structuring.

The evaluator should also look for signs of bulging, boiling or sluffing, as well as for signs of surface water seeping from the sides of the excavation or from the existing water table. If there is standing water in the cut, the evaluator shall check for quick conditions. In addition, the area adjacent to the excavation shall be checked for signs of foundations or other intrusions into the

failure zone and the evaluator should check for surcharging and the spoil distance from the edge of the excavation.

The specific terminology and definitions to the various terms used throughout the specific excavating and trenching regulations are detailed within the OSHA standards that pertain to this topic.

Grainger offers several soil testing devices (penetrometers) that are required by OSHA for all excavation sites where trenching takes place.

Source

OSHA

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Mold Remediation, Prevention and PPE – Quick Tips

Introduction

Mold is everywhere around us—outside in soil, wood and rotting

plants, and inside on carpet, drywall, wallpaper and insulation. Outside molds carry out nature's work by breaking down decaying organic material such as dead plants, fallen trees or dead animals. Inside, mold growth can cause an array of health concerns. However not all mold is harmful; without mold we would not have certain food and medicines like cheese or penicillin. Mold is one category of non-green, plant-like organisms (along with mildew, mushrooms, rusts, smuts and yeast) that fall within the fungus family. All fungal matter shares the common characteristic of being capable of growth without sunlight. Because of this, mold can be found almost anywhere, and can grow on almost anything as long as moisture and oxygen are present. Many types of mold exist with approximately 1,000 known species found in the United States, and over 100,000 species worldwide.

Health Effects

Currently, there are no federal standards or American Conference of Governmental Industrial Hygienists (ACGIH) established threshold limit values (TLVs) for airborne concentrations of mold or mold spores. According to the Environmental Protection Agency's (EPA's) Mold Remediation in Schools and Commercial Buildings resource, allergic reactions to mold are common. Mold can produce allergens that can trigger allergic reactions, asthma attacks or produce potent toxins and/or irritants. Hypersensitivity pneumonitis (lung inflammation) has also been linked to mold exposure. People with the greatest risk of health effects from mold exposures are the elderly, the very young and expectant mothers, as well as individuals with mold allergies, asthma and other chronic respiratory ailments.

Prevention

Mold growth frequently occurs when excessive moisture or water accumulates indoors. There is no feasible way to eliminate all molds and mold spores indoors, so the most effective way to control indoor mold growth is to control moisture. In buildings where mold is a problem, the mold must be remediated and the sources of moisture identified and eliminated.

It is important to dry water-damaged areas and items within 24 to 48 hours to prevent mold growth from starting. Water-damaged porous or absorbent materials, such as ceiling tiles, wallboard, cellulose and fiberglass insulation, should be discarded and replaced. Discard non-valuable books and papers. Be sure to photocopy important paperwork before discarding the originals. Use a water extraction vacuum to remove water from carpeting. Then use dehumidifiers and fans to accelerate the drying process. Carpet that becomes moldy usually must be replaced. Nonporous surfaces can be vacuumed or wiped with mild detergent and allowed to dry completely.

Moisture Control

Identify and repair leaky plumbing, roofs and other sources of water in a timely fashion to prevent moisture and mold growth. The EPA suggests you can minimize mold growth by reducing indoor humidity to below 60% and ideally between 30 and 50%. This can be done by venting bathrooms, kitchens, dryers and other moisture-generating sources to the outside; using air conditioners and dehumidifiers; increasing ventilation; and using exhaust fans whenever cooking, dishwashing and cleaning.

Also, reduce the potential for condensation on cold surfaces like windows, piping, exterior walls, roofing and floors by adding insulation. Do not install carpeting in areas where there is a continuous moisture problem, such as near drinking fountains, sinks or on concrete floors with leaks or frequent condensation.

Contamination Identification

A visual inspection is the most important initial step in identifying a possible contamination problem. The extent of any water damage and mold growth should be visually assessed. This assessment is important in determining mold remediation strategies.

Ventilation systems should also be visually checked, particularly for damp filters, but also for damp conditions elsewhere in the system and overall cleanliness. Ceiling tiles, gypsum wallboard,

cardboard, paper and other porous surfaces should be given careful attention during a visual inspection.

The use of special equipment to view spaces in ductwork or behind walls, and/or by using a moisture meter to detect moisture in building materials, may be helpful in identifying hidden sources of mold growth and the extent of water damage.

Remediation

The EPA's remediation guide for schools and commercial buildings offers detailed recommendations for a variety of mold removal scenarios and is a tremendous resource for anyone facing a mold problem.

Mold should be cleaned as soon as it appears. OSHA considers small remediation areas, less than 30 square feet (sq. ft.), of mold, which can be cleaned using a detergent/soapy solution or an appropriate household cleaner and allowed to dry completely. For larger areas (30-100 sq. ft.), there are commercial products that can be used for cleaning, disinfecting and sanitizing. Mold-resistant coatings are also available for use on insulation materials and inside duct work. A HEPA vacuum can be used to clean items such as furniture, concrete, carpeting or books after the material has been thoroughly dried.

According to OSHA, for small areas of mold growth, an N95 respirator, non-vented goggles and long gloves compatible with the chemicals used for surface cleaning should be worn. For larger mold remediation jobs, or in situations where high levels of airborne dust or mold spores are likely or long-term exposures are expected, the EPA suggests a full-face, powered air purifying respirator (PAPR) along with disposable coveralls, gloves and shoe covers. The cleaned area should be thoroughly dried. Dispose of any sponges or rags that were used to clean the mold, along with the used personal protective equipment (PPE).

If the mold returns quickly or spreads, it may indicate an underlying problem, such as a leak or excessive humidity. Any underlying water problems must be fixed to successfully eliminate

mold problems from reoccurring. If mold contamination is extensive, an experienced remediation professional may need to be consulted.

Sources

EPA – Mold Remediation in Schools and Commercial Buildings
EPA – Mold Resources
OSHA- A Brief Guide to Mold in the Workplace

OSHA Quick Card™ Mold
OSHA Fact Sheet Mold Hazards during Disaster Cleanup

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PPE for Spill Cleanup – Quick Tips

Employees who are engaged in emergency spill response operations no matter where they occur are covered by the Occupational Safety and Health Administration's (OSHA's) Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, 29 Code of Federal Regulations (CFR) 1910.120. As first steps in limiting worker

exposure to spill hazards, engineering controls and administrative (work practice) controls must first be considered. If circumstances prohibit the use of engineering controls or work practices, or these measures do not sufficiently reduce worker exposures, OSHA mandates that personal protective equipment (PPE) be used.

Once the need for PPE is established, a careful evaluation of the hazards is necessary so selections can be made to minimize the risk to the user. For chemical situations, this includes knowing the chemical(s) involved, level of exposure (or potential exposure), physical state (liquid, solid or gas), and physiological effect(s) (toxic, carcinogen, asphyxiate, corrosive, etc.). However, when responding to a spill, much of this information is not known. In situations like this, the highest level of protection is needed.

Levels of Protection

To help users choose a total PPE package for spill cleanup, the Environmental Protection Agency (EPA) Office of Emergency and Remedial Response determined four levels of chemical risks. These levels range from unknown or highly hazardous, which requires complete protection, to non-hazardous, which requires basic work attire only. Appendix B (non-mandatory) to 29 CFR 1910.120 provides guidelines that employers can use to begin the selection of appropriate PPE. Although the Appendices to 29 CFR 1910.120 are non-mandatory, paragraph 1910.120(g)(3)(i) states “Personal protective equipment (PPE) shall be selected and used which will protect employees from the hazards and potential hazards they are likely to encounter as identified during the site characterization and analysis.”

Level A protection is required when the greatest potential for exposure exists and when the highest level of skin, respiratory and eye protection is required.

Required:

- Positive pressure, full face-piece self-contained breathing

apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).
- Totally-encapsulating chemical-protective suit.
- Gloves, inner and outer, chemical-resistant.
- Boots, chemical-resistant, steel toe and shank.

Optional (as applicable):

- Long underwear.
- Hard hat (under suit).
- Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit).

Level B protection is designed to offer the highest level of respiratory protection, but a lesser level of skin protection.

Required:

- Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by NIOSH.
- Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).
- Gloves, inner and outer, chemical-resistant.
- Boots, outer, chemical-resistant, steel toe and shank.

Optional (as applicable):

- Boot-covers, outer, chemical-resistant (disposable).
- Hard hat.
- Face shield.

Level C features the same type of clothing as level B, but has a lower level of respiratory protection. An air-purifying respirator is used in place of a self-contained breathing apparatus (SCBA). This level is used when the chemical(s) and the airborne concentration(s) are known and it has been established that an air-purifying respirator is appropriate protection for the hazard.

The following constitute Level C equipment:

Required:

- Full-face or half-mask, air purifying respirators (NIOSH approved).
- Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).
- Gloves, inner and outer, chemical-resistant.

Optional (as applicable):

- Boots (outer), chemical-resistant steel toe and shank.
- Boot-covers, outer, chemical-resistant (disposable).
- Hard hat.
- Escape mask.
- Face shield.

Level D offers the lowest level of protection and is used when no potential or actual hazard exists. It offers minimal protection for nuisance exposure—generally a work uniform. The following constitute Level D equipment:

Required:

- Boots/shoes, chemical-resistant steel toe and shank.

Optional:

- Boot-covers, outer, chemical-resistant (disposable).
- Safety glasses or chemical splash goggles.
- Hard hat.
- Escape mask.
- Face shield.

Suit Material Selection

After the appropriate level of PPE for spill cleanup has been determined, the choice of chemical protective clothing (CPC) material must be considered. The more important factors in selecting the appropriate CPC are chemical resistance and suit

design.

The effectiveness of the CPC to resist chemicals is generally measured by permeation testing. Permeation is the process by which a chemical moves through a sample of protective clothing material at a molecular level. Permeation testing tells us two things: breakthrough time and permeation rate. Permeation tests are conducted by following ASTM F739 Test Method for Permeation by Liquids and Gases. Breakthrough time is the time it takes the test chemical to pass from the outside surface of the sample to the inside surface of the sample. Permeation rate is the speed at which the test chemical passes through the sample once breakthrough has occurred. The ASTM F739 method only tests a swatch of the actual CPC fabric. This means that the potential for permeation through a zipper, seam, etc. is not determined. Chemical resistance data is available from many manufacturers and distributors. Unpublished data may be supplied by manufacturers upon request.

Suit design deals with how a garment is put together. Seams are an important aspect of suit design. Two pieces of material can be joined by either stitching or welding. The stitching process can create pin holes that may allow penetration of chemicals. Welded seams involve cementing or welding tape over the stitched seam. The welded seam offers a higher level of protection against exposure to contaminants.

Choosing a Glove Material

As with CPC, chemical resistance and the physical characteristic of a glove material are important. Different glove materials resist different chemicals, so no one glove is suited for all chemical exposures. A glove that is well-suited for one application may prove dangerous for another. Glove material selection must be based on the glove manufacturer’s chemical resistance guide. The actual chemical compatibility of a given glove material can vary from manufacturer to manufacturer. Another factor to consider is chemical combinations. Glove permeation guides generally list test data for pure chemicals only, not mixtures. In the non-mandatory Appendix B to the PPE standard 29

CFR 1910 subpart I, OSHA recommends the following for chemical mixtures:

“11(c) For mixtures and formulated products, (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials. For further information on chemical combinations, check the Safety Data Sheet provided by the manufacturer.”

Choosing Protective Eye and Face Protection

Eye and face protective equipment is available in several styles, sizes and materials. It is very important to match the proper protection to your work application. OSHA’s regulation 29 CFR 1910.133 requires the use of eye and face protection when workers are exposed to eye or face hazards such as flying objects, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. OSHA’s regulation 29 CFR 1910.132(c) requires all PPE to be of safe design and construction for the work to be performed. To satisfy this requirement, the majority of eye and face protection in use today is designed, tested and manufactured in accordance with the American National Standard for Occupational and Educational Personal Eye and Face Protection Devices ANSI Z87.1-2010 or 2015 standard.

Goggles offer the most complete protection because they form a seal around the eye area preventing tiny dust particles, chemical splashes and vapors from irritating the eyes. There are two types of goggles: vented and non-vented (vented can be either indirect or direct). Non-vented goggles are just that, lenses and frames with no holes for air to seep through. They offer a higher level of protection against vapors and fumes, and can be used to keep harmful vapors out of sensitive eyes. Indirect-vented goggles are capped to allow air to move freely in and out without allowing splash or particles in. They offer the same impact protection as the direct-vented goggles. Lens fogging can be a problem. You may want to consider an anti-fog lens coating to alleviate any

potential problems. Direct-vented goggles offer protection from impact only. They fit snugly around the eye area to prevent flying objects from striking your eyes. They also offer more comfort because they allow air to flow in and out to reduce the chance of fogging.

ANSI Z87.1-2015 defines a face shield as “a protector intended to shield the wearer’s face, or portions thereof from certain hazards, as indicated by the face shield’s markings.” A protector is a complete device—a product with all of its components in their configuration of intended use. Although it would seem that face shields meeting the performance criteria of the 2015 standard can be used as standalone devices, all references in the modified Eye and Face Protection Selection Tool refer to “face shields worn over goggles or spectacles.”

Chemical resistant face shield visors are constructed from several types of materials. These materials include polycarbonate, propionate, acetate, and polyethylene terephthalate glycol (PETG). It is important to select the proper visor for the work environment.

Polycarbonate material provides the best impact and heat resistance of all visor materials. Polycarbonate also provides chemical splash protection and holds up well in extremely cold temperatures. Polycarbonate is generally more expensive than other visor materials.

Acetate provides the best clarity of all the visor materials and tends to be more scratch resistant. It also offers chemical splash protection and may be rated for impact protection.

Propionate material provides better impact protection than acetate while also offering chemical splash protection. Propionate material tends to be a lower price point than both acetate and polycarbonate.

Polyethylene terephthalate glycol (PETG) offers chemical splash protection and may provide impact protection. PETG tends to be the most economical option for face shield choices.

Sources

29 CFR 1910 Subpart I Personal Protective Equipment

29 CFR 1910.120 Hazardous Waste Operations and Emergency Response

29 CFR 1910.133 Eye and Face Protection

ANSI Z87.1-2015 American National Standard for Occupational and Educational Personal Eye and Face Protection Devices

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Construction Sites and Water Runoff – Quick Tips

It might surprise you to hear that sediment runoff rates from construction sites are typically 10 to 20 times greater than those from agricultural lands, and 1000 to 2000 times greater than those from forested lands. To address this issue, the Environmental Protection Agency (EPA) has regulations that focus specifically on construction sites and water runoff. The Federal Water Pollution Control Act prohibits the discharge of any pollutant to a

navigable water from a point source unless that discharge is authorized by a National Pollution Discharge Elimination System (NPDES) permit. Construction sites for which a NPDES permit is sought will fall into one of two categories, or phases.

Phase I

This phase addresses discharges from large construction activities disturbing five or more acres.

Phase II

Phase II affects many more entities than Phase I, because it pertains to smaller construction sites between one and five acres. Phase II can also cover construction sites under one acre if they are part of a larger common plan of development or sale with a planned disturbance of between one and five acres. To get a good sense of the requirements, a few definitions are in order.

Point source: A point source is any discernable, confined and discrete conveyance, such as a pipe, ditch, channel, tunnel, conduit, discrete fissure or container. It also includes vessels or other floating craft from which pollutants are or may be discharged. By law, the term "point source" also includes concentrated animal feeding operations, which are places where animals are confined and fed. By law, agricultural stormwater discharges and return flows from irrigated agriculture are not "point sources."

Navigable water or water of the United States: The term "water of the United States" means navigable waters, tributaries to navigable waters, interstate waters, the oceans out to 200 miles and intrastate waters which are used: by interstate travelers for recreation or other purposes, as a source of fish or shellfish sold in interstate commerce, or for industrial purposes by industries engaged in interstate commerce.

Operator: An Operator in this instance is a party or parties that have:

- Control of construction project plans and specifications

- Day-to-day operational control of those activities that are necessary to ensure compliance with a storm water pollution prevention place (SWPPP) for the site or other permit conditions

NPDES permit: This is a permit that translates general requirements of the Clean Water Act into specific provisions tailored to the operations of each person discharging pollutants.

Requirements

Phase II construction programs require operators of Phase II small construction sites to obtain an NPDES permit if the operators are discharging pollutants from a point source to waters of the United States. The NPDES permit contains limits on what can be discharged, monitoring and reporting requirements and other provisions to ensure that the discharge does not hurt water quality or people's health. These regulated entities must implement stormwater pollution protection programs or stormwater management programs using best management practices to effectively reduce the discharge of pollutants into receiving waters. There may also be additional state, tribal or local construction site water runoff programs required in certain areas.

The EPA has recommended that the NPDES permitting authorities use their existing Phase I large construction permits as a guide in developing the Phase II permits. Although the specific NPDES permitting authority may have different requirements, the Phase II permits will typically consist of three main components:

1. Submission of notice of intent: This notice of intent will include general information on the site and what is going to be done at the site.
2. Stormwater pollution prevention plan(SWPPP): Almost all NPDES permitting authorities are going to require a type of SWPPP that will detail how you are going to control the runoff.
3. Notice of termination: Once the project is completed or is taken over by another operator a notice of termination would be submitted.

Frequently Asked Questions

Q: Do I need an NPDES permit for construction site water runoff?

A: It depends on where you discharge pollutants. If you discharge from a point source into waters of the United States, you need an NPDES permit. If you discharge pollutants into a municipal sanitary sewer system, you do not need an NPDES permit, but you should ask the municipality about their permit requirements. If you discharge pollutants into a municipal storm sewer system, you may need a permit depending on what you discharge. You should ask the NPDES permitting authority.

Q: Where do I apply for a NPDES permit?

A: NPDES permits are issued by states that have obtained EPA approval to issue permits or by EPA Regions in states without such approval.

Source

Stormwater Phase II Small Construction Program Overview

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How do Moisture Meters Work – Quick Tips

A moisture meter is an essential instrument used in many industries to detect moisture content in materials. Home and building inspectors rely on moisture meters to identify potential problems and damage to structures from moisture buildup. Woodworking industries, such as furniture makers, use wood moisture meters to insure a quality product. Flooring contractors use moisture meters to determine ideal conditions when installing a floor over a concrete slab or subfloor.

Indicator scales on moisture meters can vary in appearance, but all will indicate moisture content in percent (%MC). While some moisture meters offer an analog scale, others read %MC digitally. The accuracy of the %MC readings, as well as the appropriate substrate scales, vary per meter and can vary by brand and type.

Most moisture meters are calibrated to wood, which provides a relatively accurate reading in wood moisture content. Typically, this scale ranges in the 5 to 40% range. When testing the moisture content in non-wood materials, such as concrete, a relative scale of 0 to 100 is often used, where 0 is bone dry and 100 is saturated. This is a relative scale. Moisture meters include visual LED indicators related to the percent reading on the scale for dry, moderate and saturated or wet readings. Additionally, some meters also offer a third scale for readings of gypsum. These scale readings can range from 0.2 to 50% moisture content. When selecting a moisture meter for sheetrock, it is advised that a moisture meter that offers a scale reading for gypsum be used.

Color indicators on moisture meters are helpful in determining whether the material being tested is considered dry or if there is a potential problem with moisture. The green (dry), yellow (moderate) and red (high) indicators typically identify where on the scale of %MC the readings occur. This can clear up confusion where one interprets a %MC as dry versus one that is moderate and may require more thorough investigation to determine if a problem

with moisture in the material exists, especially if a visible sign of moisture does not exist.

Types of Moisture Meters

There are three common types of moisture meters used for the inspection of building and structure materials: pin-type, pinless and pin/pinless/all-in-one. All three types of moisture meters offer specialized purpose and are unique to the end user's application in determining %MC in materials.

Pin-Type Moisture Meter

Pin-type moisture meters have two pins on the instrument, which are used to penetrate into the test surface at a desired depth. The %MC is measured at the depth of the head of the contact pins. These meters use the principle of electrical resistance to measure the %MC by measuring the conductivity between the pins and typically read up to 5/16″ deep. The tips of the pins are relatively sharp, uninsulated and penetrate into the surface for a sub-surface reading. This method is often viewed as an invasive process. With pin-type meters, you can also obtain a reading by touching the pins to the surface for testing.

Most pin-type moisture meters use a scale calibrated to wood, however this does not mean that the meters cannot be used to measure moisture in other substrates and materials. These types of moisture meters can also be used forconcrete, drywall, ceiling tiles, painted surfaces and more. When using the wood scale on a pin-type moisture meter, the %MC reading can range from 5% to 40% in moisture content. Generally, the low end of this reading will fall into the 5 to 12% range, the moderate range will be 15 to 17%, and the high or saturated range will read above 17%. Scales for %MC ranges are provided in the instrument instructions and should be consulted for specific surface materials measuring ranges.

A pin-type moisture meter is the best way to identify the exact location of moisture buildup. When insulated contact pins are used, only the uncoated tips are exposed, providing an accurate

reading of moisture content at various levels of penetration. Pin-type meters are the only instruments that allow the inspector to identify exact location of moisture at a given point. Using a pin-type meter is an effective way to determine the difference between shell and core moisture content.

Pinless Moisture Meter

Pinless or noninvasive moisture meters operate on the principle of electrical impedance.

This type of meter provides a nondestructive measurement of moisture in wood and other substrates, such as concrete and gypsum. A noninvasive moisture meter may also be called a nondestructive or a pinless moisture meter. Scales on these meters are similar to that of pin-type meters, where the wood scale reads %MC at 5 to 30%, but also reads %MC for nonwood materials (typically concrete) on a relative scale of 0 to 100. They can read up to a typical depth of ¾ inch or 1 inch into a subsurface. They are useful for detecting problem moisture buildup where visual indicators are not evident.

Pinless moisture meters are commonly used to determine moisture content on a relative scale of 0-100 in concrete subfloors and flooring prior to laying a wood floor or other decorative flooring surface. They are also used for identifying possible moisture buildup behind bathroom/shower tiles, under vinyl flooring and other finished surfaces, as well as to determine if water-borne finishes are adequately dry prior to a second application.

Pin/Pinless/All-in-One Moisture Meter

A third and possibly more useful moisture meter would be a pin/pinless/all-in-one moisture meter. This type of moisture meter utilizes both methods for measuring %MC. and therefore one meter may be used to identify problem areas and then also used to pinpoint the exact location where moisture damage or buildup is occurring. Essentially, this type of meter would utilize the same scales of %MC for wood and nonwood substrates and allow the end user the versatility necessary for a full inspection in

determining areas where moisture is an issue.

Ideally, due to its diversity, this type of meter could be utilized by flooring specialists, indoor air quality (IAQ) specialists, general contractors and home/building inspectors.

Accessories for Additional Monitoring Capability

Generally, pin-type and pinless moisture meters provide moisture readings that are limited in depth. However, in some applications, readings of moisture deeper than 5/16″ are necessary. If this is the case, many meters are equipped with a connection option to add accessory probes that can be inserted further into a substrate for more accurate core or depth detection. An example would be for Exterior Insulated Finish Systems (EIFS) testing. Moisture problems in EIFS are typically found within stucco surfaces and stem from poor sealant application around window and door frames or are a result of faulty flashing installation. EIFS probes are used to test for %MC within these structures.

For deep penetration, long-insulated contact pins may be used to obtain a moisture content measurement taken at depth. Holes may need to be drilled into the surface for testing and then the extra-deep pins are inserted into the pre-drilled holes and %MC measurements are taken at the tip of the pins where they are not insulated. Insulating all but the tips of these pins prevents a false moisture content reading and provides a more accurate reading at the depth where the tips of the pins are exposed.

In order to obtain a depth without drilling holes into the surface, a hammer probe can be used to measure moisture content in wood at different levels of penetration by inserting a long pin into a wood surface for up to 1-1/2″ depth readings. Hammer probes are ideal for shell and core tests to detect moisture gradients and to test lumber with wet surfaces.

Other applications may require measuring %MC on surfaces that are out of reach or in a relatively inaccessible area, such as under sinks or in ventilation areas. If this is the case, then using a pin-type moisture meter attachment may come in handy so the

reading can still be obtained on the meter while the measurement is being taken at the source. Not all meters offer attachment ports for remote testing, EIFS testing or deep penetration. Typically this is an optional feature.

Commonly Asked Questions

Q: How do I care for my moisture meter?

A: Moisture meters used for inspection are generally factory calibrated. To keep your meter in good working condition:

- Store the meter in a clean, dry location
- Change batteries and pins as needed. Running a moisture meter on low batteries may cause the meter to go out of calibration
- Keep the electrodes and meter clean by using a biodegradable cleaner sparingly on external parts only

If repairs or re-calibrations must be done on the meter, it is suggested to return the meter to the manufacturer or manufacturer service center for service and re-calibration to original standards.

Q: What type of moisture meter works best for water-damaged structures?

A: To quickly identify wet areas in walls and floors, pinless meters are easy to use. They offer the convenience of testing a large area quickly and help you determine if further testing is required in certain spots.

On the other hand, a pin-type moisture meter is the best way to identify the exact location of water damage behind walls, in subfloors or in any other area where moisture may be hidden behind another surface. The key to finding hidden moisture is to use an electrode with insulated contact pins. These pins read only at their uninsulated pin tips, allowing the user to drive the pins into material at various depths, noting readings at each level of penetration.

Q: How far should I drive non-insulated pins into wood?

A: Drive pins into the wood at full depth if possible. At moisture levels below 10%, it is essential to make positive contact with the substrate to get an accurate reading.

Q: Can I use a moisture meter to check for pest infestation?

A: Yes. A few meter readings in key locations of the structure will quickly indicate if the areas are safe or in danger of infestation. Using pin-type meters for pest control applications is the best way to identify the exact point of infestation behind walls and ceilings. The meters make this possible by detecting moisture in areas where pests can grow and thrive without human interaction. While fungi and mold begin to grow in wood with moisture content around 20%, some species of insects thrive in wood with only 12%MC.

Sources

How Does a Moisture Meter Work, Anyway?

Extech

Extech Frequently Asked Questions

General Tools

Tramax Meters

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Source: Grainger Know How – https://www.grainger.com/know-how

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OSHA Scaffolding Requirements – Quick Tips

The very presence of scaffolding at a job site creates a hazardous work environment. Falls, falling objects and structure instability are all dangerous possibilities and pose a threat to safety in the workplace. The Occupational Safety and Health Administration's (OSHA's) construction scaffolding requirements and the 1996 revisions to 29 Code of Federal Regulations (CFR) 1926 Subpart L make working on or around scaffolding safer.

Originally adopted in 1971, OSHA's first construction scaffolding requirements remained relatively unchanged until 1996. The 1996 revisions are performance-based, which means the standards do not tell users specifically what to do. Performance-based standards provide guidelines and may specify some requirements, but in general, the "how to" part of the equation is left up to the user. The specifics of compliance depend on the types of scaffolding being used, the situations they are used in and the personnel using them.

The 1996 revisions also addressed types of scaffolding not previously mentioned, the greater variety of personal fall protection systems available and training.

In November 2016 revisions to OSHA's general industry Walking and Working Surfaces Standard (29 CFR 1910 Subpart D) were finalized. Several revisions were made including the removal of all existing general industry scaffolding requirements. Employers are now required to comply with the construction industry standards in 29 CFR 1926 Subpart L. This is codified under 29 CFR 1910.27(a).

This document focuses on three key topics covered in 29 CFR 1926

Subpart L – training, fall protection and working safe distances from energized power lines.

For additional information, visit OSHA's Scaffolding Safety and Health Topics page, eTool. and 29 CFR 1926 Subpart L.

Because of the complexity and size of 29 CFR 1926 Subpart L, this document will only discuss three topics: training, fall protection and working safe distances from energized power lines.

Training

When OSHA revised its Scaffolds standard in 1996, the Bureau of Labor Statistics (BLS) studies showed that 25% of workers injured in scaffold accidents had received no scaffold safety training. To prevent this from continuing, OSHA strengthened the training requirements.

Training requirements are discussed in 29 CFR 1926.454. Employers must 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 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.

- The nature of any electrical hazards, fall hazards and falling object hazards in the work area;
- The correct procedures for dealing with electrical hazards and for erecting, maintaining and disassembling the fall protection systems and falling object protections systems being used;
- The proper use of the scaffold and the proper handling of materials on the scaffold;
- The maximum intended load and the load-carrying capacities of the scaffolds used; and
- Any other pertinent requirements.

Fall Protection

Per 1926.451(g)(1), OSHA has determined a fall protection threshold of 10 feet for scaffolding (also note American National Safety Institute A10.8-2011). This threshold differs from Subpart M (fall protection), which requires the use of fall protection at six feet for most construction activities. Different thresholds are required because scaffolds are temporary structures erected to aid workers who are constructing or demolishing other structures, and scaffolds are less amenable to the use of fall protection at the time the first level is erected.

Table 1 details the types of fall protection needed with specific types of scaffolding.

Table 1

Scaffolding Type	Personal Fall Protection	Guard Rail	Grab Rope
Scaffolding Type Boatswain Chair	**Personal Fall Protection** X	**Guard Rail** -	**Grab Rope** -
Scaffolding Type Catenary	**Personal Fall Protection** X	**Guard Rail** -	**Grab Rope** -
Scaffolding Type Crawling board	**Personal Fall Protection** X	**Guard Rail** X	**Grab Rope** X
Scaffolding Type Float	**Personal Fall Protection** X	**Guard Rail** -	**Grab Rope** -
Scaffolding Type Ladder jack	**Personal Fall Protection**	**Guard Rail** -	**Grab Rope** -

Scaffolding Type	Personal Fall Protection	Guard Rail	Grab Rope
	X		
Scaffolding Type Needle beam	**Personal Fall Protection** X	**Guard Rail** -	**Grab Rope** -
Scaffolding Type Self-contained	**Personal Fall Protection** X	**Guard Rail** X	**Grab Rope** -
Scaffolding Type Single-point adjustable suspension	**Personal Fall Protection** X	**Guard Rail** X	**Grab Rope** -
Scaffolding Type Two-point adjustable suspension	**Personal Fall Protection** X	**Guard Rail** X	**Grab Rope** -

Employers are responsible for providing fall protection and ensuring its use. Since September. 2, 1997, employers have been required to have a competent person determine whether fall protection is necessary and feasible for employees erecting or dismantling supported scaffolds. Supported scaffolds consist of one or more platforms supported by rigid, load-bearing members, such as poles, legs, frames, outriggers, etc. 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.

Safe Distances from Energized Power Lines

Per 29 CFR 1926.451(f)(6), scaffolds cannot be erected, used, dismantled, altered or moved closer than the distances stated below in Table 2 when near energized power lines.

Table 2 Insulated Lines

Voltage	*Minimum Distance*	*Alternatives*
Voltage Less than 300 volts	*Minimum Distance* 3 feet	*Alternatives* -
Voltage 300 volts to 50 kilovolts (kV)	*Minimum Distance* 10 feet	*Alternatives* -
Voltage More than 50 kV	*Minimum Distance* 10 feet plus 0.4 inches for each 1 kV more than 50 kV	*Alternatives* 2 times the length of the line insulator, but never less than 10 feet

Uninsulated Lines

Voltage	*Minimum Distance*	*Alternatives*
Voltage Less than 50 kV	*Minimum Distance* 10 feet	*Alternatives* -
Voltage More than 50 kV	*Minimum Distance* 10 feet plus 0.4 inches for each 1 kV more than 50 kV	*Alternatives* 2 times the length of the line insulator, but never less than 10 feet

However, scaffolds can be moved closer if it is necessary for the performance of work, provided the power lines are de-energized or protective coverings are installed to help prevent accidental contact. For more information, refer to 29 CFR 1926.451(f)(6) Exception.

Commonly Asked Questions

Q: What types of equipment are recommended for a personal fall protection system?

A: A personal fall protection system consists of an anchorage point, body belt or body harness and might include a lanyard, deceleration device, lifeline or a combination of these.

Q: Are extension cords considered exposed power lines?

A: No. Extension cords and power tool cords are not included in the definition of an exposed power line.

Sources

29 CFR 1926 Subpart L

29 CFR 1910.27 Scaffolds and Rope Decent Systems

OSHA Safety and Health Topics – Scaffolding

OSHA Scaffolding eTool

29 CFR 1926 Subpart L

Scaffolding Hazards and Possible Solutions

ANSI/ASSP A10.8-2011

29 CFR 1926.451 Scaffolds – General Requirements

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Source: Grainger Know How – https://www.grainger.com/know-how

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Gas Cylinder Storage and Handling – Quick Tips

Hundreds of different materials are packaged in compressed gas cylinders—atmospheric gases, fuel gases, refrigerant gases, poison gases, etc. The hazards associated with these gases include oxygen displacement, explosion hazards, toxic effects and the physical hazards of a ruptured cylinder. The Occupational Safety and Health Administration (OSHA) references general requirements for

compressed gases in 29 Code of Federal Regulations (CFR) 1910.101 and specific gas requirements are found in:

- 29 CFR 1910.102 – Acetylene
- 29 CFR 1910.103 – Hydrogen
- 29 CFR 1910.104 – Oxygen
- 29 CFR 1910.105 – Nitrous Oxide
- 29 CFR 1910.110 – Storage and Handling of Liquefied Petroleum Gases (LPG)
- 29 CFR 1910.111 – Storage and Handling of Anhydrous Ammonia

Gas Cylinder Inspection: General Requirements

29 CFR 1910.101(a) states employers must visually inspect compressed gas cylinders to ensure that they are in a "safe condition." Visual cylinder inspections should look for leaks, bulging, defective valves, evidence of physical abuse, fire or heat damage, pitting, rusting or corrosion. If cylinders do not pass a visual inspection they need to be repaired and re-qualified per Department of Transportation (DOT) regulations.

Visual and other inspections must be conducted as described in the DOT Hazardous Materials Regulations (49 CFR 171 – 180).

Where the DOT regulations are not applicable, visual and other inspections must be conducted as prescribed in the Compressed Gas Association's (CGA) C-6 Standard for Visual Inspection of Steel Compressed Gas Cylinders (revised June 28, 2013) and C-8 Standard for Requalification of DOT-3HT, CTC-3HT and TC-3HTM Seamless Steel Cylinders (revised November 6, 2017) pamphlets.

Gas Cylinder Storage and Handling: General Requirements

Per 29 CFR 1910.101(b), the in-plant handling, storage and utilization of all compressed gas cylinders must be in accordance with CGA Pamphlet P-1 Standard for Safe Handling of Compressed Gases in Containers (revised March 23, 2015).

Gas cylinders should be properly secured at all times to prevent tipping, falling or rolling. They can be secured with straps or chains connected to a wall bracket or other fixed surface, or by

use of a cylinder stand.

The gas cylinders should be stored in a cool, dry, well-ventilated, fire-resistant area that meets all applicable federal, state and local regulations.

When a gas cylinder is empty or not being used, ensure that the valve is closed, the regulator removed and the valve protector cap is secured in place.

Gas cylinders should be transported using hand trucks designed for that purpose and the cylinders should be secured so that they do not tip, fall or roll.

Appropriate lifting devices, such as cradles or nets, are required when a crane, hoist or derrick is used to transport gas cylinders. Do not use magnets or slings to lift gas cylinders. Do not use the valve protection cap for lifting a gas cylinder.

It is necessary to take precautions so that gas cylinders are not dropped or allowed to strike each other or other objects. Dropping or striking may damage the gas cylinder valve, which could turn the gas cylinder into a dangerous torpedo with the potential to destroy property and/or injure personnel.

Consult the appropriate safety data sheet (SDS) for detailed information on the chemical contained in the gas cylinder. Specific chemical handling and storage precautions will be outlined in the SDS. The SDS will also have specifications for appropriate personal protective equipment (PPE) for worker protection.

Always reference the OSHA specific requirements highlighted earlier if handling or storing Acetylene, Hydrogen, Oxygen, Nitrous Oxide, LPG, or Anhydrous Ammonia in your facility.

Commonly Asked Questions

Q: Can full and empty cylinders be stored together?

A: According to CGA P-1 pamphlet, full and empty cylinders should be stored separately to minimize handling of cylinders.

Q: Can gasoline and other flammable liquids be stored with compressed gas cylinders?

A: No. Highly flammable substances should not be stored near gas cylinders according to the CGA's p-1 pamphlet.

Sources:
OSHA 29 CFR 1910.101 Compressed gases (general requirements)
C-6 Standard for Visual Inspection of Steel Compressed Gas Cylinders, Edition 11, June 28, 2013
C-8 Standard for Requalification of DOT-3HT, CTC-3HT and TC-3HTM Seamless Steel Cylinders, Edition 8, November 6, 2017
P-1 Standard for Safe Handling of Compressed Gases in Containers, Edition 12, March 23, 2015
49 CFR Subtitle B Chapter I

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Source: Grainger Know How – https://www.grainger.com/know-how

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Workplace Housekeeping in

General Industry – Quick Tips

Housekeeping is a broad term that refers to the routine maintenance and upkeep of a workplace. The Occupational Safety and Health Administration (OSHA) has found good workplace housekeeping reduces injuries and accidents, improves morale, reduces fire potential and can even make operations more efficient.

OSHA makes reference to housekeeping in several general industry standards:

- Walking-working surfaces 29 Code of Federal Regulations (CFR) 1910.22(a) & (d)
- Flammable liquids 29 CFR 1910.106(e)(9) & (h)(8)
- Explosives and blasting agents 29 CFR 1910.109(g)(4)(vi)(f)
- Sanitation 29 CFR 1910.141(a)(3)
- Material handling 29 CFR 1910.176(c)
- Grain handling facilities 29 CFR 1910.272(j)
- Asbestos 29 CFR 1910.1001(k)
- Inorganic arsenic 29 CFR 1910.1018(k)
- Lead 29 CFR 1910.1025(h)
- Chromium VI 29 CFR 1910.1026(j)
- Cadmium 29 CFR 1910.1027(k)
- Bloodborne pathogens 29 CFR 1910.1030(d)(4)
- 1,2 – dibromo-3-chloropropane 29 CFR 1910.1044(k)
- Acrylonitrile 29 CFR 1910.1045(k)
- Formaldehyde 29 CFR 1910.1048(j)
- Methylenedianiline 29 CFR 1910.1050(l)
- Silica 29 CFR 1910.1053(h)

New Walking and Working Surfaces (WWS) Standard

On November 17, 2016, OSHA published a revised WWS rule in the Federal Register with an effective date of January 17, 2017. The rule updates the general industry WWS standard specific to slip, trip and fall hazards – common issues in unkempt workplaces.

29 CFR 1910.22

The revised general industry workplace housekeeping requirements

are referenced in 29 CFR 1910.22. Employers must ensure that:

- 22(a)(1): All places of employment, passageways, storerooms, service rooms, and walking working surfaces are kept in a clean, orderly, and sanitary condition.
- 22(a)(2):. The floor of each workroom is maintained in a clean and, to the extent feasible, in a dry condition. When wet processes are used, drainage must be maintained and, to the extent feasible, dry standing places, such as false floors, platforms, and mats must be provided.
- 22(a)(3): Walking-working surfaces are maintained free of hazards such as sharp or protruding objects, loose boards, corrosion, leaks, spills, snow, and ice.
- 22(d)(1): Walking-working surfaces are inspected regularly and as necessary, and maintained in a safe condition.
- 22(d)(2): Hazardous conditions on walking-working surfaces are corrected or repaired before an employee uses the walking-working surface again. If the correction or repair cannot be made immediately, the hazard must be guarded to prevent employees from using the walking-working surface until the hazard is corrected or repaired.

Maintaining A Housekeeping Program

In order to ensure that proper workplace housekeeping is maintained, a continuous process involving both workers and custodial personnel is required. Housekeeping should be incorporated into all processes, operations and tasks performed in the workplace. Efforts should be concentrated in high traffic areas, such as around stairs, platforms and ladders; around work stations and machines; and in storage areas. Each worker needs to understand that workplace housekeeping is an integral part of his/her job and not merely a supplement to work he/she already performs. And, as workplace housekeeping becomes a standard part of operations, less time and effort are needed to maintain it at an appropriate level.

Use walk-through surveys to identify, evaluate and control the hazards that may be created by the lack of proper workplace housekeeping. These surveys send a message to all employees that

workplace housekeeping is viewed as an important part of everyone's job. A survey checklist is an effective tool to track performance and to communicate successes and areas requiring additional attention.

Frequently Asked Questions

Q: Who is responsible for workplace housekeeping?

A: All employees share the responsibilities of keeping their work stations and work areas free from the accumulation of materials. Additional responsibilities are often assigned to custodial employees or specific departmental employees.

Q: When should workplace housekeeping efforts be performed?

A: Workplace housekeeping levels are most easily maintained if they are completed throughout the day as needed. At the end of the shift, all areas should be thoroughly cleaned in preparation for the next day or the following shift.

Q: Is a written program required?

A: No. OSHA does not require a written housekeeping program for general industry. However, there is a reference to written housekeeping procedures that may be applicable under the fire prevention plan standard 29 CFR 1910.39(b) and 1910.39(c)(2):

29 CFR 1910.39(b)"Written and oral fire prevention plans. A fire prevention plan must be in writing, be kept in the workplace, and be made available to employees for review. However, an employer with 10 or fewer employees may communicate the plan orally to employees." In accordance with 1910.39(c)(2) a fire prevention plan must include "procedures to control accumulations of flammable and combustible waste materials."

Source

29 CFR Subpart D Walking and Working Surfaces, Revised November 2016.
29 CFR 1910, OSHA General Industry Standards

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Source: Grainger Know How – https://www.grainger.com/know-how

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Quick Course – The Basics of Forklift Safety

Course Description

This quick course covers hazards of working with forklifts – both as drivers and pedestrians and how to protect yourself from these dangers whether you are operating the forklift or working around it.

Quick Course – Report it or

Regret it

Course Description

This quick course covers the importance of reporting incidents like close calls or broken/damaged equipment. It also covers tips on fixing or reporting hazards and your obligation to report.

Quick Course – Gloves Must Match Chemical Hazard

Course Description

This course covers the dangers gloves are designed to safeguard you from and the importance of matching the right glove to the hazard of work.

Quick Course – Teamwork and Culture

Course Description

This quick course covers the importance of teamwork and culture in the workplace including the dangers of not working as a team and the benefits of teamwork.

OSHA Requirements Machine Guarding – Quick Tips

Identify all the potential hazards in your workplace that require machine safeguarding and ensure they adhere to OSHA regulations.

Moving machine parts create workplace hazards and potential machinery-related injuries, making machine guards vitally important. All machines consist of three fundamental areas – the point of operation, the power transmission device and the operating controls. Machine safeguarding helps protect workers from preventable injuries in all three areas.

The Occupational Safety and Health Administration's (OSHA's) requirements for machine guarding are found in 29 Code of Federal Regulations (CFR) 1910 Subpart O, Machinery and Machine Guarding as detailed below;

- 211 – Definitions
- 212 – General requirements for all machines
- 213 – Woodworking machinery
- 214 – Cooperage machinery [Reserved]
- 215 – Abrasive wheel machinery
- 216 – Mills and calendars in the rubber/plastics industries
- 217 – Mechanical power presses
- 218 – Forging machines
- 219 – Mechanical power-transmission apparatus

General Requirements

29 CFR 1910.212(a)(1) states that one or more methods of machine guarding must be used to protect operators and other employees from hazards, including those created by point of operation, in-running nip points, rotating parts, flying chips and sparks.

Hazardous Mechanical Motions and Actions

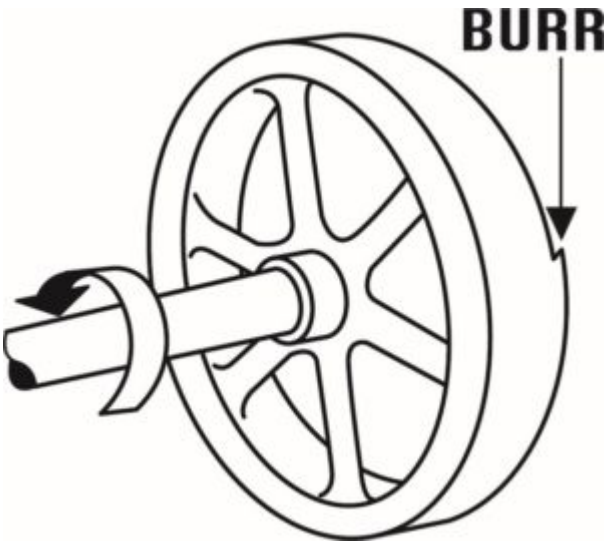
Identifying hazards is the first step toward protecting workers and promoting safety in the workplace. The basic types of hazardous mechanical motions and actions are:

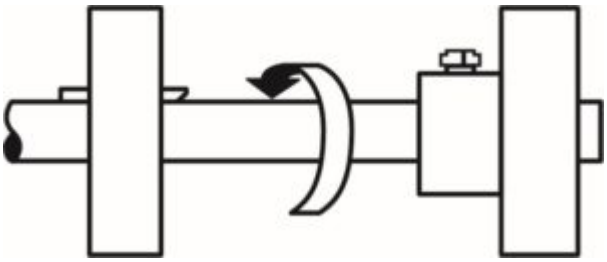
Motions	Actions
Rotating	Cutting
In-running nip points	Punching
Reciprocating	Shearing
Transversing	Bending

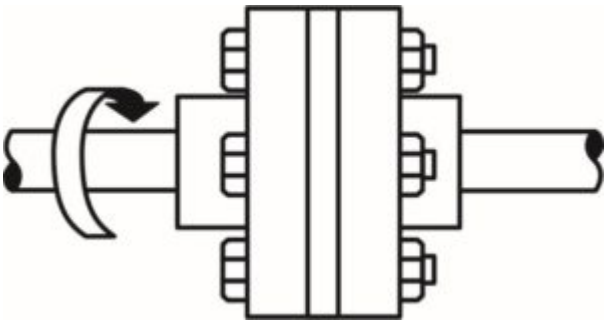
Examples of Hazardous Mechanical Motions

A *rotating* motion can be dangerous. Even smooth, slowly rotating shafts can grip clothing, and through mere skin contact, force an arm or hand into a dangerous position.

Collars, couplings, cams, clutches, flywheels, shaft ends, spindles and horizontal or vertical shafting are examples of common hazardous rotating mechanisms. The danger increases when bolts, nicks, abrasions and projecting keys or setscrews are exposed on rotating parts.

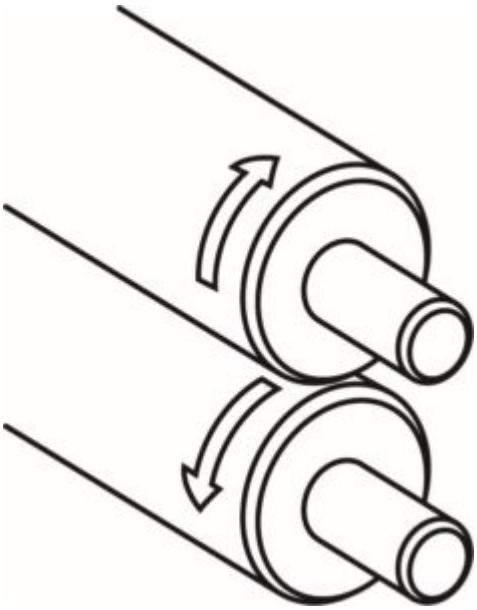






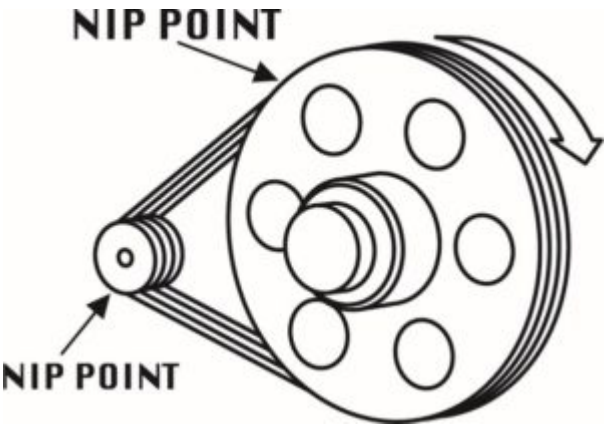
Rotating parts cause hazards such as in-running nip points. There are three main types of in-running nip points. Parts can rotate closely to each other in opposite directions while their axes are parallel to each other. When they run closely, the stock fed between two rolls produces a nip point. This danger is common on machines with intermeshing gears, rolling mills and calendars.

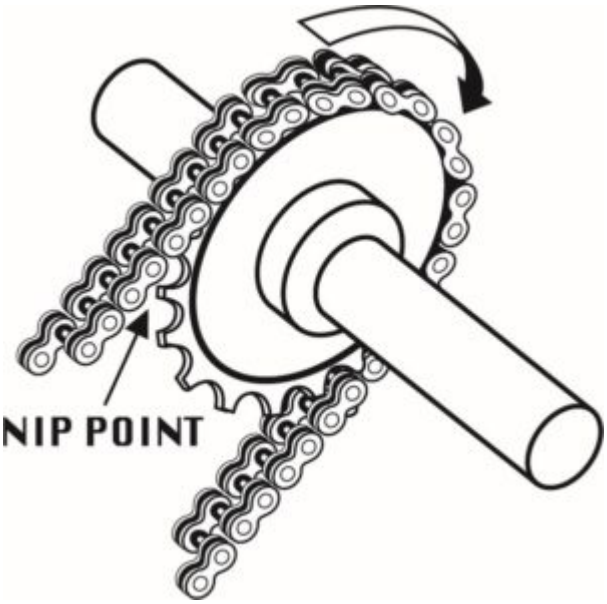


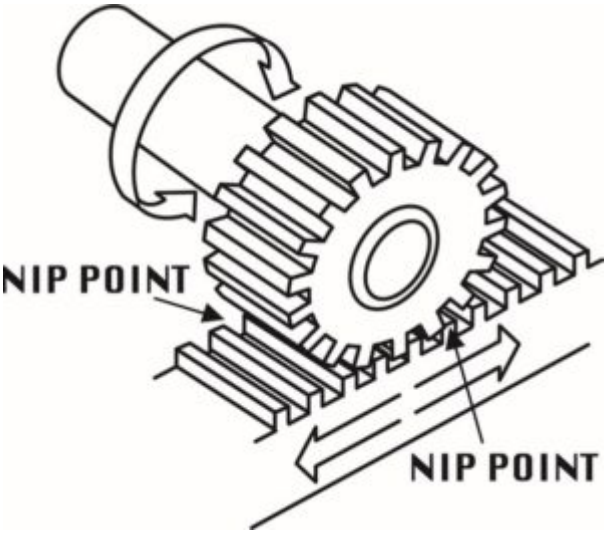




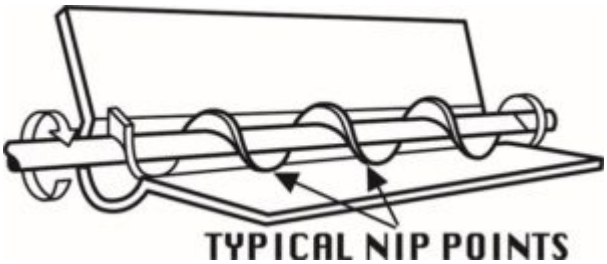
Rotating and tangentially moving parts also cause nip points. Potential hazards include the points of contact between a power transmission belt and its pulley, a chain and its sprocket, or a rack and pinion.



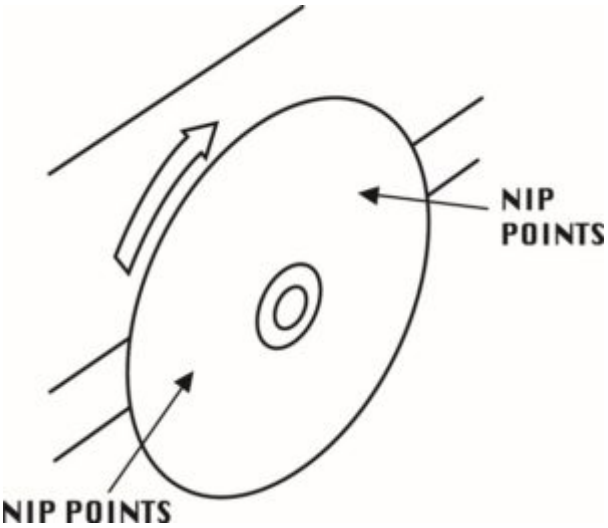




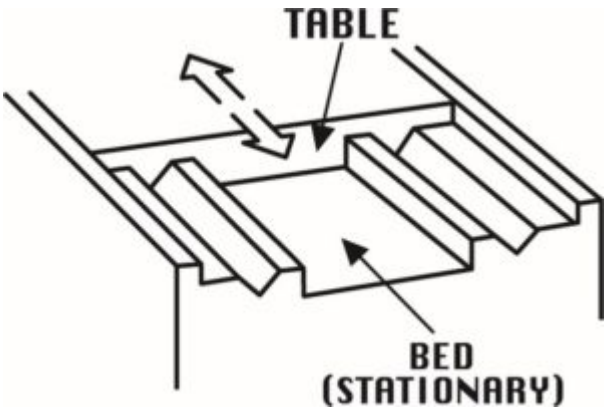
Nip points also occur between rotating and fixed parts, spoked hand wheels on flywheels, screw conveyors and the periphery of an abrasive wheel – and create shearing, crushing or abrading actions.

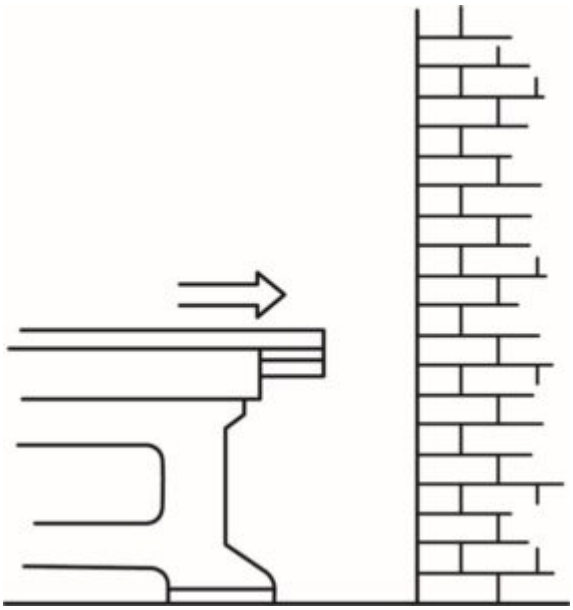




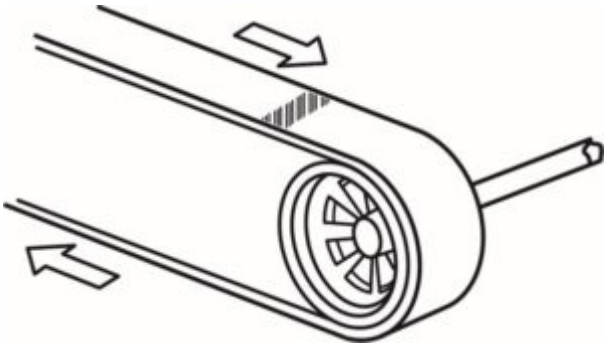


Reciprocating motions cause a back-and-forth or up-and-down action that can strike a worker or catch a worker between a moving and a stationary part.



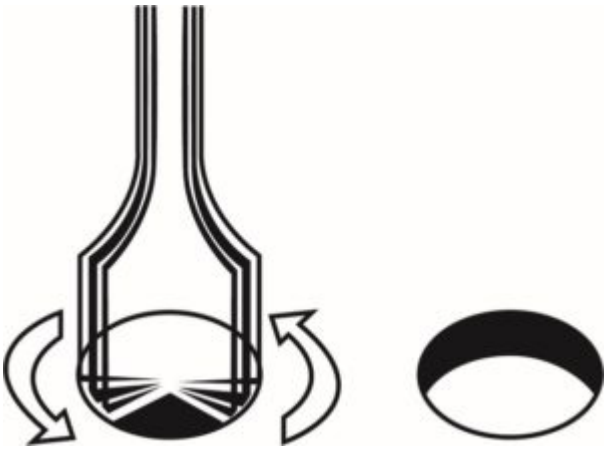


With transverse motion – movement in a straight continuous line – moving parts can catch or strike a worker in a pinch point or shear point.

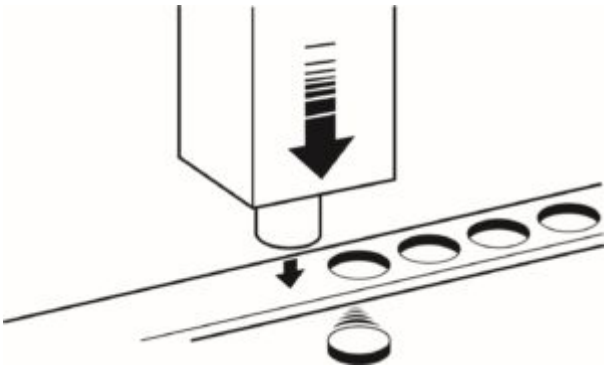


Examples of Hazardous Mechanical Actions

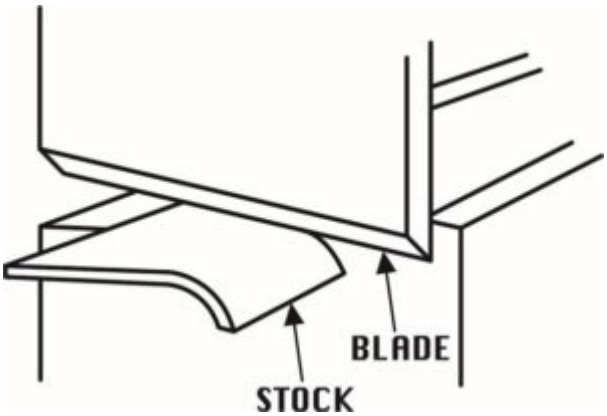
Cutting action hazards involve rotating, reciprocating or transverse motion, where finger, head and arm injuries can occur and where flying chips and scrap material can strike a worker’s eyes or face. Cutting actions are dangers with bandsaws, circular saws, and boring or drilling machines.



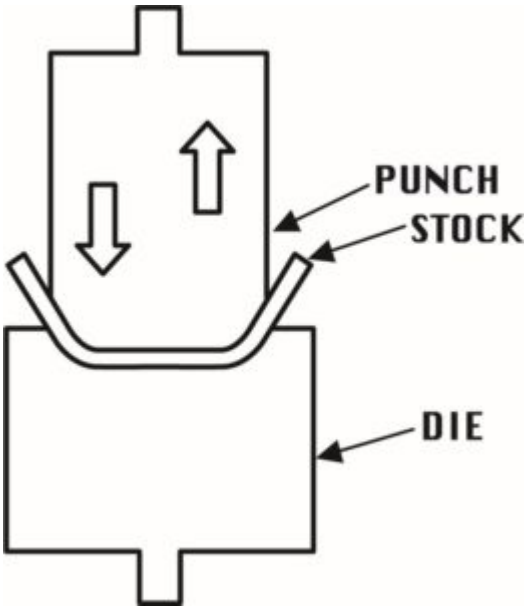
Punching action results when power is applied to a slide (ram) for the purpose of blanking, drawing or stamping metal or other materials. The danger occurs where stock is inserted, held and withdrawn by hand as with power presses.



Shearing action involves applying power to a shear or knife to trim or shear materials such as metal. The danger is where stock is inserted, held and withdrawn, as with hydraulically or pneumatically powered shears.



Bending action results when power is applied to a slide to draw or stamp metal or other material. This is a threat where stock is inserted, held and withdrawn, as with equipment such as power presses.



Requirements for Safeguards

Machine safeguards must meet these minimum general requirements:

1. Prevent contact: The safeguard must prevent hands, arms or any other part of a worker's body from contacting dangerous moving parts.
2. Be secure: Workers should not be able to easily remove or tamper with the safeguard. Guards and safety devices should be made of durable materials that will withstand normal use. They must be firmly secured to the machine where possible or secured elsewhere if attachment to the machine is not possible.
3. Protect from falling objects: The safeguard should ensure that no objects can fall into moving parts.
4. Create no new hazards: A safeguard defeats its own purpose if it creates a hazard such as a shear point, a jagged edge or an unfinished surface. Edges of safeguards should be rolled or bolted so that they eliminate sharp edges.
5. Create no interference: Any safeguard that impedes a worker from performing a job quickly and comfortably might be bypassed or disregarded. Proper safeguarding can enhance efficiency because it relieves a worker's injury apprehensions.
6. Allow safe lubrication: If possible, the machine should be able to be lubricated without removing the safeguard. Locating oil reservoirs outside the guard, with a line

leading to the lubrication point, will reduce the need for the operator or maintenance worker to enter the hazardous area.

Types of Safeguarding

The type of operation, the size or shape of stock, the method of handling, the physical layout of the work area, the type of material and production requirements or limitations help determine the best method for safeguarding.

Safeguards are classified as either guards or devices.

Guards

Guards are barriers which prevent access to dangerous areas. There are four general types of guards:

1. *Fixed guards* are permanent parts of a machine. These guards are preferable because they're simple and permanent.
2. *Interlocked guards* automatically shut off or disengage power through a tripping mechanism when it is opened or removed. The machine cannot cycle or start until the guard is replaced.
3. *Adjustable guards* are useful because they accommodate various sizes of stock.
4. *Self-adjusting guards* allow the opening of these barriers to be determined by the movement of the stock. As the operator moves the stock into the danger area, the guard is pushed away, providing an opening that only is large enough for the stock.

Devices

Safety devices perform several functions. They may stop a machine if any part of a body is inadvertently placed in the danger area. They may restrain or withdraw an operator's hands from the danger area. They may require both hands on a control, therefore keeping both hands out of the danger area. They may also provide a synchronized barrier with the machines operating cycle to prevent entry into the danger area.

Devices include:

- *Presence-sensing devices* are divided into two groups. Photoelectrical devices use light sources and controls that can interrupt the machine's operating cycle. Radiofrequency or capacitance devices use a radio beam that is part of the machine control circuit. When the capacitance field is broken, the machine will stop or not activate.
- *Electromechanical sensing devices* have a probe or contact bar that descends to a predetermined distance when the operator initiates the machine cycle. If there is an obstruction preventing it from descending to its full, predetermined distance, the control circuit does not start the machine cycle.
- *Pullback devices* use cables attached to the operator's hands, wrists and/or arms. They are used primarily on machines with stroking-action hazards. When the slide/ram is up (between cycles), the operator has access to the points of operation. When the slide/ram begins to descend, a mechanical link automatically assures that the operator's hands move away from the point of operation.
- *Restraint (hold-back) devices* allow the operator's hands to travel only in a predetermined safe area and prevent the operator from reaching into a danger area. Cables or straps are attached to the operator's hands and a fixed point. No extending or retracting actions are involved.
- *Safety trip controls*, such as pressure-sensitive body bars, safety tripods and safety tripwire cables, quickly deactivate a machine in an emergency.
- *Two-hand controls* require both hands and constant pressure on the controls for the machine to operate.
- *Two-hand trip* requires in sync application of both the operator's control buttons to activate the machine cycle after which the hands are free. To be effective, both the controls and trips must be located so that the operator cannot use two hands or one hand and another part of their body to trip the machine.
- *Gates* are movable barriers that protect the operator at the point of operation before the machine cycle starts. To be

effective, gates must be interlocked so that the machine will not begin a cycle unless the gate guard is in place.

Though not actual guards or devices, location and distance can keep employees safe by placing a machine in an infrequently traveled area or where it’s dangerous moving parts are not accessible. A thorough hazard analysis of each machine and situation is essential before using this safeguarding technique

Guard Construction

Guards designed and installed by the machine producer are desirable because they conform to the design and function of the machine, and they can be designed to strengthen the machine or to serve some additional functional purpose.

User-built guards are sometimes necessary and have some advantages. Often, with older machines, they are the only practical solution. They also might be the only choice for mechanical power transmission apparatuses in older plants, where machinery may not be powered by individual motor dries. User-built guards can be designed and built to fit unique and changing situations and can be installed on individual dies and feeding mechanisms. They also permit options for point-of-operation safeguards. When workers design and install machine guards, they develop a better knowledge of those guards and how they work.

However, there are some disadvantages. User-built guards might not conform well to the configuration and function of the machine and might be poorly designed or built.

Guard Materials

Metal, plastic, wood or any other material that is substantial enough to withstand impact and prolonged use are all used as construction materials for machine guards. In many circumstances, metal is the best material for guards. It might also be feasible to use plastic where higher machine visibility is required. Guards made of wood are generally not recommended because of their flammability and lack of durability and strength.

29 CFR 1910.219 Mechanical power-transmission apparatus, states that wood guards can be options in woodworking and chemicals industries, and in industries where vapors or gases or other conditions could deteriorate metal guards. Wood guards also may be used in construction work and in outdoor locations where extreme cold make metal guards undesirable. In all other industries, wood guards are not allowed, per 29 CFR 1910.219 (o)(2).

Summary

The list of possible machinery-related injuries created by moving machine parts is long – amputations, lacerations, crushing injuries, and abrasions, Machine safeguards are essential for protecting worker from these preventable injuries. Please click the link to review Grainger's product line of machine guards.

Sources
29 CFR 1910 Subpart O
OSHA Machine Guarding E-Tool

Frequently Asked Questions

Q: What is the point of operation?

A: The point of operation is where work is performed on the material, such as cutting, shaping, boring, or forming of stock.

Q: When must the blades of a fan be guarded?

A: The blades of a fan must be guarded when the periphery of the blades is less than seven feet above the floor or working level. The guards must not have openings larger than one-half inch (29 CFR 1910.212(a)(5)).

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specific to your business and/or activities and should not be construed as legal advice or opinion. Readers with specific questions should refer to the applicable standards or consult with an attorney.

Source: Grainger Know How – https://www.grainger.com/know-how

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When Does the Lockout Tagout Standard Apply – Quick Tips

OSHA's Control of Hazardous Energy (Lockout/Tagout) general industry standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or startup of machines or equipment, or release of stored energy, could cause injury to employees. Employees servicing or maintaining machines or equipment may be exposed to serious physical harm or death if hazardous energy is not properly controlled. The Lockout/Tagout (LO/TO) standard establishes minimum performance requirements for the control of hazardous energy sources such as electrical, mechanical, hydraulic, pneumatic, chemical, and thermal.

29 CFR 1910.147(a)(1)(ii)(A-E) of the general industry standard identifies the following areas the standard does not cover:

- Employment covered by Construction (1926), Agriculture (1928), Longshoring (1918), Marine Terminals (1917), or Shipyards (1915)
- Installations under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering
- Exposure to electrical hazards from work on, near, or with conductors or equipment in electric-utilization installations, which is covered by 29 CFR 1910 Subpart S

- Oil and gas well drilling and servicing

To better understand when the LO/TO standard applies, OSHA has identified two key workplace activities. The first is normal production. This is defined as any utilization of a machine or piece of equipment to perform its intended purpose. The second is servicing and/or maintenance. This is defined as any action that is necessary to prepare or maintain a machine or piece of equipment for normal production.

As a general principle, the LO/TO standard **does not** apply to normal production activities **unless** the employee is required to remove or bypass machine guarding required by 29 CFR Part 1910 Subpart O, Machinery and Machine Guarding, **or** place any part of their body in an area where unexpected startup of the machine or equipment may cause injury.

If any of the following exceptions or exemptions are applicable to the servicing/maintenance activity being performed, then the LO/TO standard does not apply:

1. Complying with the minor servicing exception (29 CFR 1910.147(a)(2)(ii)(B))
2. Utilizing the cord and plug connected equipment or hot tap exemptions (29 CFR 1910.147(2)(iii)(A) and (B) respectively)
3. Effectively guarding the machine/equipment in compliance with 29 CFR Part 1910 Subpart O

If you’re unsure about any activity that may or may not fall under the scope of this standard, always play it safe and perform the lockout.

Commonly Asked Questions

1. **What specific criteria must be met for the minor servicing exception to apply?**

A: Minor tool changes and adjustments, and other minor servicing activities that take place during normal production operations, are not covered by the standard if they are routine, repetitive, and integral to the use of the equipment for production, provided

that the work is performed using alternative measures (remote oilers, specially designed servicing tools, etc.) that provide effective protection.

1. **Do I have to lock out/tag out a machine that only requires the unit to be unplugged?**

A: No. The standard does not apply in situations where work on cord- and plug-connected electric equipment is under the exclusive control of the employee performing the servicing or maintenance.

1. **Are there any other standards related to lockout/tagout?**

A: Yes. OSHA has used 29 CFR 1910.212, General Requirements for All Machines, and 29 CFR 1910.219, Mechanical Power Transmission Apparatus, to cite businesses for a lack of compliance. In addition, 29 CFR 1910.333, Selection and Use of Work Practices, sets forth requirements to help protect employees working on electric circuits and equipment. This section requires workers to use safe work practices, including lockout/tagout procedures. These areas also allow OSHA to issue a double citation for noncompliance.

Sources

29 CFR 1910.147, 1910.219, and 1910.333.

ANSI/ASSP Z244.1-2016, Control of Hazardous Energy Lockout/Tagout and Alternative Methods, 2016

OSHA LO/TO eTool, Lockout/Tagout Interactive Training Program, March 2008

(Rev 1/2019)

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Source: Grainger Know How – https://www.grainger.com/know-how

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Using Insulated Hand Tools to Avoid Arc Flash Incidents – Quick Tips

Insulated hand tools play a role in creating a safe workplace for employees who are working near energized circuits

Whether they're high in the sky working on power lines, elbow-deep in a generator, or re-wiring a critical piece of control equipment on the factory floor, electrical workers need tools that are designed and engineered for maximum safety.

Because insulated tools and energized environments go hand-in-hand, there are some key points to keep in mind when buying, using and retesting such tools. Here's a look at some of the most important:

Buying and Using Insulated Hand Tools

Used to protect workers working live or close to live parts against arc flash, arc blasts and electrocution, insulated tools are rated at 1,000 volts AC (and 1,500 volts DC), but are subjected to 10,000 volts during the product testing process (as mandated by ASTM F1505). Hand tools covered by ASTM F1505 include screwdrivers, wrenches, pliers, nippers, strippers, cable cutting

tools, cable scissors, knives and tweezers.

Complying both with the National Fire Protection (NFPA) 70E® and the International Electrotechnical Commission (IEC) 60900 standards, insulated tool sets are individually tested and certified by the manufacturer for specific working conditions.

When purchasing insulated hand tools, safety directors should seek out those that comply with IEC, ASTM, and/or the Deutsches Institut fur Normung (DIN) standards. While these groups do not test the individual tools for compliance (manufacturers do their own testing), they do set the insulation performance requirements for the tools.

The Verband der Elektrotechnik, Elektronik und Informationstechnik (VDE), the association of German electro technicians, is an independent agency that tests a sample of each tool to ensure compliance.

To increase tool life and ensure that the insulated hand tools provide protection for users, be sure to:

- Keep tools clean and dry
- Inspect insulation before each use
- If you doubt the integrity of the insulation, destroy the tool or have it retested
- Follow the manufacturer’s temperature recommendations for use
- Have a qualified person inspect and recertify tools annually for safe use
- Use other personal protective equipment as necessary

Retesting Hand Tools

Although there aren’t specific requirements for retesting insulated hand tools, in compliance with 29 CFR 1910.335(a)(1)(ii), protective equipment must be maintained in a safe, reliable condition. Most manufacturers suggest inspecting the insulation before each use and having a qualified person perform an annual inspection and certification. To aid in the inspection process, some manufacturers offer two-layer insulation

that will change color when the insulation has been breached.

When using insulated tools, make sure workers always follow the manufacturer's recommendation. Although insulated hand tools are tested and certified to 1,000 volts AC, the testing agencies do not recommend using them on energized circuits, for example, and most insulating tools are designed only for protection from accidental contact with energized circuits

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Source: Grainger Know How – https://www.grainger.com/know-how

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Ventilation Guidelines for Flammable and Chemical Storage Cabinets – Quick Tips

Chemical storage cabinets, whether used for flammables, corrosives or pesticides/poisons, come with capped bung openings that allow for ventilation. While cabinet manufacturers may provide the bungs for ventilation purposes, venting flammable liquid storage

cabinets is NOT required or even recommended by any federal regulatory agency. Cabinet manufacturers include venting bungs for users who may be required to vent by state or local codes, individual company policies, insurance carrier policies or any other authority having jurisdiction (AHJ).

Don’t Vent Unless You Have To

According to the National Fire Protection Association (NFPA) Code 30, Flammable and Combustible Liquids Code, venting a flammable storage cabinet is not necessary for fire protection purposes. Flammable and combustible liquid storage cabinets are designed to help protect the internal contents from a fire outside of the cabinet. A vented cabinet could compromise the ability of the cabinet to protect its contents from a fire.

NFPA 30-2018 Edition, 9.5.4 states, “Storage cabinets shall not be required by this code to be ventilated for fire protection purposes.” Additionally, in Annex A, NFPA offers further reinforcement that venting is not necessary. A.9.5.4 states, “Venting storage cabinets has not been demonstrated to be necessary for fire protection purposes. Additionally, venting a cabinet could compromise the ability of the cabinet to adequately protect its contents from involvement in a fire because cabinets are not generally tested with venting. Therefore, venting of a storage cabinet is not recommended.”

If venting is being considered, 9.5.4.2 addresses some minimal design requirements. It states, “If a storage cabinet is ventilated for any reason, the vent openings shall be ducted directly to a safe location outdoors or to a treatment device designed to control volatile organic compounds (VOCs) and ignitable vapors in such a manner that will not compromise the specified performance of the cabinet and in a manner that is acceptable to the AHJ.” If the cabinet is not vented, the NFPA code requires that the bung caps remain sealed as 9.5.4.1 states, “If a storage cabinet is not ventilated, the vent openings shall be sealed with the bungs supplied with the cabinet or with bungs specified by the manufacturer.”

While not federally mandated, state or local AHJ may require venting. NFPA 30 acknowledges this under A.9.5.4 where it states, “However, it is recognized that some jurisdictions might require storage cabinets to be vented and that venting can also be desirable for other reasons, such as health and safety.”

How Do I Know If I Need to Vent My Flammable Storage Cabinet and How Is It Done?

As it’s clearly indicated above, from a federal regulatory compliance perspective there is no requirement to vent a cabinet. To determine if additional regulations or requirements apply to your specific situation, you’ll need to confer with your AHJ.

Should you learn from your AHJ that ventilating your flammable storage cabinet is a requirement, be sure to obtain clear and detailed instructions as to how the cabinet needs to be vented. They should not only supply the “how” but also specific requirements for the equipment needed to mechanically vent the cabinet.

NFPA 30 does offer additional venting guidance should the AJH deem it necessary. A.9.5.4.2 states “A “safe location” should be selected as the location of a vent discharge to minimize the potential for ignitable vapors to travel to a source of ignition after discharge from the vent. Electrical equipment that does not meet the requirements for hazardous locations can serve as an ignition source. The Technical Committee advises that vent discharge locations should consider such factors as the following:

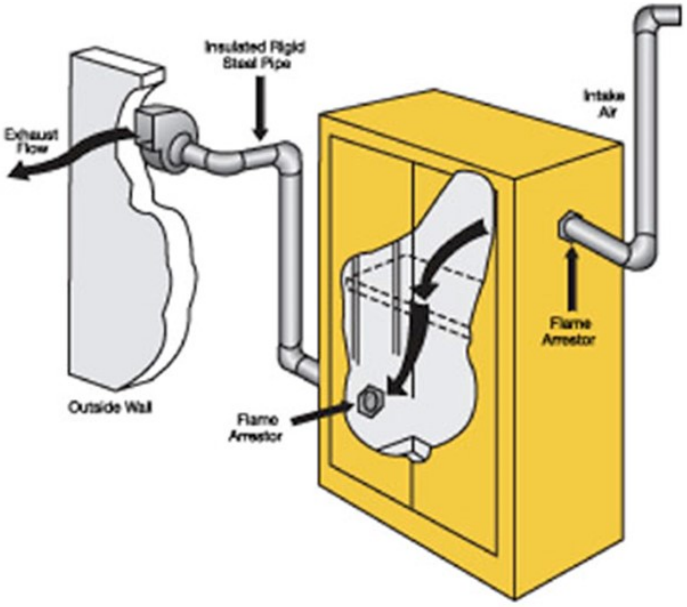
1. *Characteristics of the exhausted material (vapor density, toxicity, velocity of discharge, etc.)*
2. *Proximity to potential ignition sources*
3. *Building openings such as doors, windows, air intakes and so forth*
4. *Dispersion characteristics (distance to discharge within the flammable range, direction of discharge, atmospheric conditions, and the influence of building and neighborhood buildings on discharge vapors)*
5. *Likelihood of vapor accumulation following discharge, such*

as an accumulation under building eaves

6. *Likelihood of sufficient discharge volume to allow an ignitable concentration to reach an ignition source*

Historically, NFPA 30 has provided prescriptive guidance, often based on area classification requirements, and results have been acceptable. Closer distances should be accepted only if an analysis by a qualified person justifies closer distances. Similarly, the specified distances might not be acceptable for all installations, thus the guidance provided above.

Again, these are general guidelines taken from current NFPA references. Your AHJ that's requiring you to vent is the ultimate authority regarding how the cabinet must be vented.



The above NFPA guidelines refer specifically to flammable liquid storage cabinets; if, at the request of your AHJ, you're required to vent a corrosives/acid cabinet, make sure to incorporate a blower that's compatible with the vapors being exhausted. Also be aware that if it's a hazardous material you're venting, you may not be allowed to exhaust to the outside due to the health hazards the vapors present.

For more information on chemical storage in the workplace, see Quick Tips #181: Chemical Compatibility Concerns in Storage. For additional information on flammable liquids in the workplace, see Quick Tips #179: Flammable Liquids and Quick Tips #180: NFPA

30: A Guide to Flammable Liquids.

Commonly Asked Questions

Q: Are there any options short of venting to control the levels of vapors inside flammable and chemical storage cabinets?

A: Vapor trap filters are available for storage cabinets that contain activated carbon to aid in lowering the levels of VOCs or corrosive vapors inside the cabinets.

Q: Do I need self-closing doors?

A: Self-closing doors are not a federal requirement; however, some states and/or local municipalities do enforce the International Fire Code (IFC) or the NFPA 1 Fire Code which does mandate self-closing doors. To find out if you are in an area that requires self-closing doors, contact your local fire marshal or AHJ.

Sources
NFPA 30 Flammable and Combustible Liquids Code, 2018 Edition
29 CFR 1910.106 Flammable Liquids

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Ground Fault Circuit Interrupters – Quick Tips

OSHA 1910.399 defines a ground fault circuit interrupter, or GFCI, as "a device whose function is to interrupt the electric circuit to load when a fault current to ground exceeds some predetermined value, that is less than that required to operate the over-current protective device of the supply circuit."

Ground fault circuit interrupter is designed to shut off electric power within as little as 1 /40 of a second. The mechanism compares the amount of current going into the electric equipment to the amount of current returning along the circuit conductors. If the current exceeds six milliamperes, the ground fault circuit interrupter discontinues the current to prevent electrocution.

These safety devices can be incorporated into special outlets, included as part of a power cord or placed in-line to continually monitor the current passing through a receptacle. When a difference in current is sensed, indicating a leakage, the GFCI quickly breaks the circuit to prevent injury.

Ground fault circuit interrupters protect people the way breakers and fuses protect wiring in a home or business. As electricity follows the path (route) of least resistance, if an individual were to touch an electrical system with a leak that did not have a ground fault circuit interrupter, the individual would serve as a better route for the electricity to pass through. Conversely, if the electrical system with a leak had a ground fault circuit interrupter, the device would activate before the electricity reached the person.

Where are they used?

Ideal areas for using ground fault circuit interrupters include wet or humid environments and high-risk areas where people could come into contact with ground, or ground equipment. In home use, ground fault circuit interrupters can typically be found in

kitchens and bathrooms. Other applications include outdoor outlets, spas and swimming areas. Occupations that use ground fault circuit interrupters include dairy farms, breweries, steam plants and construction sites.

The following ground fault circuit interrupter regulations come from OSHA's Construction Standard 1926.404 – Wiring Design and Protection for Construction Sub part K of the 29 Code of Federal Regulations (CFR):

1926.404 (b)(l)(ii)

Ground fault circuit interrupters (GFCIs). All 120V, single-phase 15A and 20A 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 personal 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 ground surfaces need not be protected with ground fault circuit interrupters.

1926.404 (b)(l)(iii)

Assured equipment grounding conductor program. The employer shall establish and implement an assured equipment grounding conductor program on construction sites covering all cord sets, receptacles which are not a part of the building or structure and equipment connected by cord and plug which are available for use or used by employees. The program shall comply with the following minimum requirements:

1926.404 (b)(l)(iii)(A): A written description of the program, including the specific procedures adopted by the employer, shall be available at the job site for inspection and copying by the Assistant Secretary and any affected employee.

1926.404 (b)(l)(iii)(B): The employer shall designate one or more competent persons (as designed in 1926.32(f)) to implement the program.

1926.404 (b)(l)(iii)(C): Each cord set, attachment cap, plug and receptacle of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage, shall be visually inspected before each day's use for external defects such as: deformed or missing pins, insulation damage, or indications of possible internal damage. Equipment found damaged or defective shall not be used until repaired.

Ground fault circuit program requirements

Employers must provide:

- Written description of program
- Competent person to implement the program
- Inspection and testing
- Records of test results

Inspections/Tests

Visual inspection of the following equipment is required:

- Cord sets
- Cap, plug and receptacle of cord sets
- Equipment connected by cord and plug

Exceptions:

- Receptacles and cord sets that are fixed and not exposed to damage

Frequency of tests:

- Before first use
- After repair and before placing back in service
- Before use after suspected damage
- Every three months—however, cord sets and receptacles exposed to damage must be tested at regular intervals not to exceed six months

Conduct tests for:

- Continuity of equipment of grounding conductor

- Proper terminal connection of equipment grounding conductor

Note: For additional information please see 29 CFR 1926.404

Q: Do I need to test GFCIs?

A: Yes, GFCIs should be tested periodically to ensure they are working properly. It is recommended to follow manufacturer's instructions regarding the testing of the ground fault circuit interrupter.

Source

29 CFR 1926.404

29 CFR 1910.399

N.E.C. National Electric Code

OSHA booklet: *Controlling Electrical Hazards*

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