



1926 Construction Health Hazards

Health Hazards

Potential exposures to health hazards:

- Worker on the job
- Worker's family



Source: OSHA

Objectives

1. Identify common health hazards.
2. Describe types of common health hazards.
3. Apply health hazard protection methods.
4. Recognize employer requirements to protect workers from health hazards in construction, including hazards communication program.

Health Hazards

Common Health Hazards

Chemical



Source: OSHA

Physical



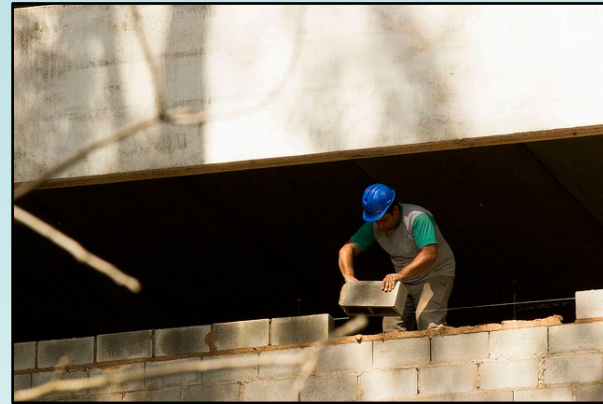
Source: OSHA

Biological



Source: OSHA

Ergonomic



Source: Arlosvaldo Gonzáfoles (Flickr.com)

Health Hazards

Common Ways Workers Encounter Chemical Hazards

- Solids
- Liquids
- Gases and vapors
- Aerosols
 - Dust, mist, fumes

Welding Fumes



Source: U.S. Navy

Asbestos



Source: OSHA

Spraying Chemicals



Source: OSHA

Silica



Source: OSHA

Lead



Source: OSHA

Health Hazards

Effects of Chemical Exposure

May put workers at risk of developing health problems:

Health Problems		
Heart Ailments	Lung Damage	Sterility
CNS Damage	Kidney Damage	Burns
Cancer	Liver Damage	Rashes

May pose risk of fire and explosion hazards:

Fire



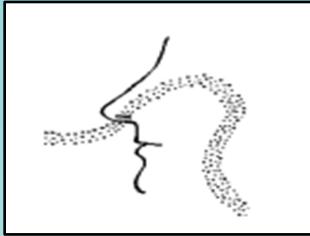
Source: Virginie Moerenhout (Flickr.com)

Explosion



Source: Jonathan Perera (Flickr.com)

Routes of Entry



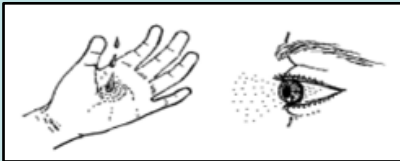
Source: OSHA

Inhalation: Breathed in (most common route)



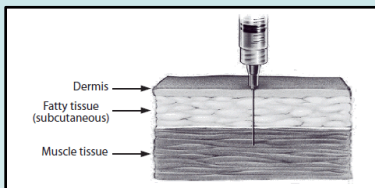
Source: OSHA

Ingestion: Swallowing via eating or drinking



Source: OSHA

Absorption: Drawn through skin or eye surface



Source: CDC

Injection: Punctures through skin

Health Hazards

Health Effects

Exposure Condition		Exposure	Example
ACUTE	Immediate	Short-term, high concentration	H ₂ S exposure within a confined space
CHRONIC	Delayed; generally for years	Continuous; for long periods of time	Asbestosis

Acute



Source: U.S. Army Corps of Engineers

Chronic



Source: OSHA

Chemical Hazard Protection

Eliminate

Substitution

Engineering

Administrative

PPE



Chemical Hazard Protection

- **Engineering**
 - Ventilation (local/general)
 - Process and equipment modification
 - Isolation/automation
- **Administrative**
 - Monitor/measure exposure levels
 - Inspections and maintenance
 - Develop SOPs
- **PPE**
 - Respirators
 - Gloves
 - Safety glasses
 - Protective clothing

Local Exhaust Ventilation



Source: OSHA

Respirable Crystalline Silica

29 CFR 1926.1153

Crystalline silica is a mineral. The most common form is quartz.



Health Hazards

Crystalline Silica Is Found In Many Construction Materials

- This includes natural materials such as sand, rock, and stone.
- It also includes man-made materials such as concrete, brick, block, mortar, tile, and artificial stone.



Department of Labor/Shawn T Moore



John F. Rekus, PE, MS, CIH, FAIHA/elcosh.org



Photo courtesy of DEWALT Industrial Tool Co.

Health Hazards

Respirable Crystalline Silica



Dust containing crystalline silica is generated when, for example, power tools are used to chip, cut, saw, drill, grind, sand, or crush crystalline silica-containing materials; it is also produced when sand is used in abrasive blasting.

Health Hazards

Respirable Crystalline Silica

This dust contains respirable particles of crystalline silica. These respirable particles are very small -- about 100 times smaller than a grain of sand found on the beach. In the picture on the right, the pen is pointing to grains of sand that are similar in size to sand found on the beach. To the right of that sand is dust made up mostly of respirable crystalline silica. The picture shows how much finer respirable crystalline silica is than beach sand.

When these very fine respirable silica particles are breathed in, they can travel deep into the lungs, where they can become trapped and cause disease.



Health Hazards

Respirable Crystalline Silica

Employers must train employees on tasks in their workplace that may expose them to respirable crystalline silica.



Health Hazards

Health Hazards of Silica

Breathing in silica can increase employees' chances of developing lung diseases, including:

- Silicosis
- Lung cancer
- Chronic obstructive pulmonary disease (COPD)

It also increases their chances of developing:

- Kidney diseases
- Autoimmune diseases

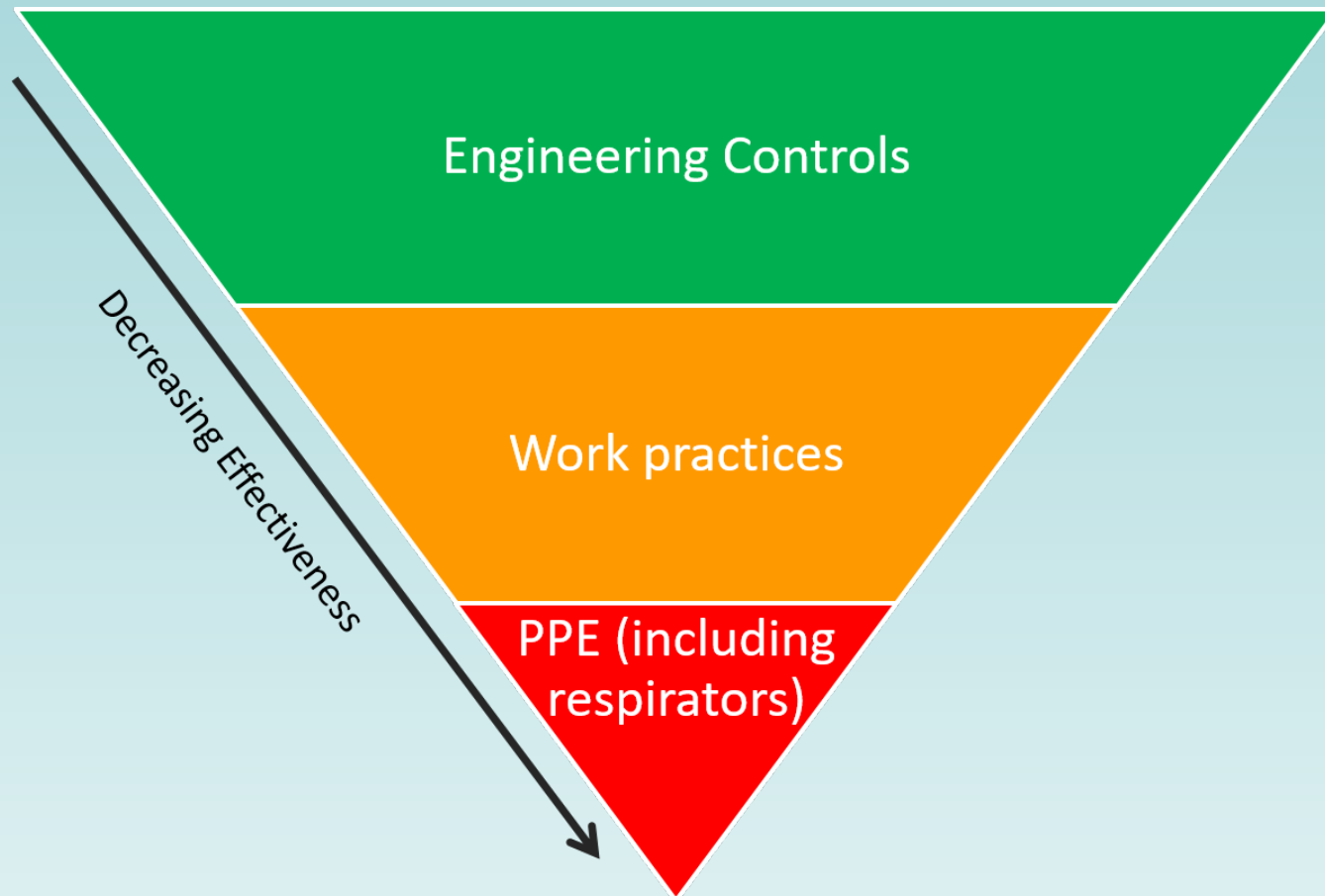
The higher the levels of silica that employees are exposed to and the longer they are exposed to it, the greater the chances of developing these diseases.

Health Hazards

Respirable Crystalline Silica

Protecting Employees

Hierarchy of Controls



Health Hazards

Respirable Crystalline Silica

Engineering Controls

Cutting block
without engineering controls



Cutting block using water to
control the dust

Health Hazards

Respirable Crystalline Silica

Engineering Controls

Grinding mortar without engineering controls



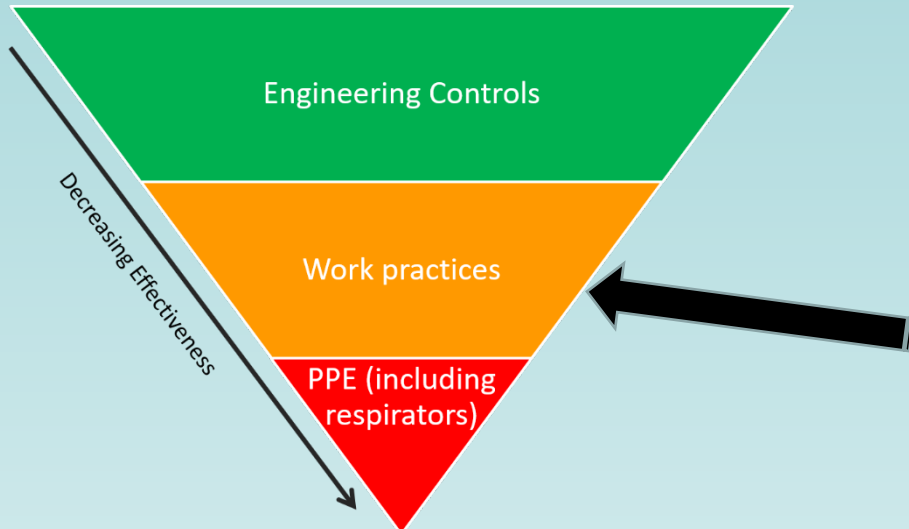
Grinding mortar using a vacuum dust collector

Health Hazards

Respirable Crystalline Silica

Work Practice Controls

Example: Fixing controls that are not working properly

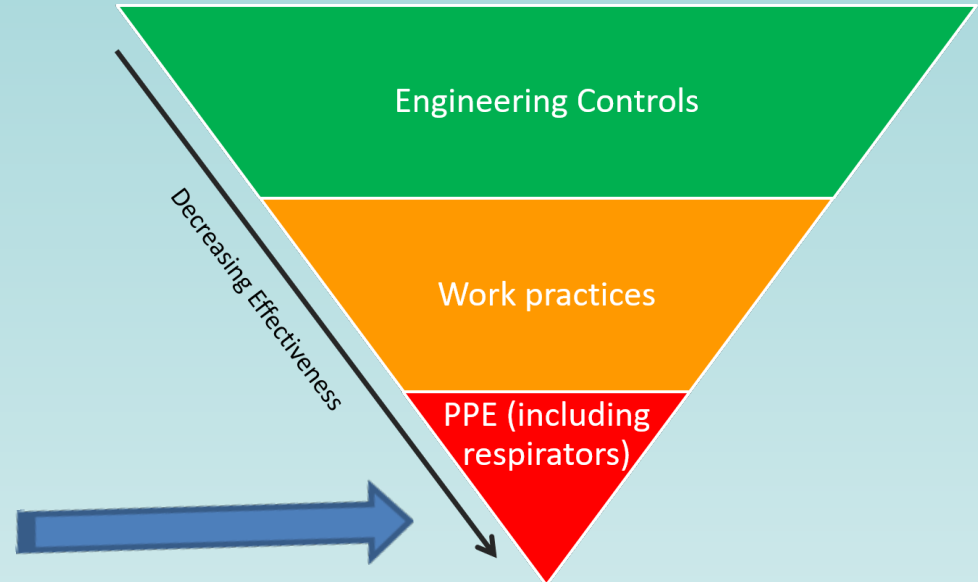


Health Hazards

Respirable Crystalline Silica

PPE

Personal protective equipment, such as respirators, is at the bottom of the hierarchy of controls.



Health Hazards

Respirable Crystalline Silica

Specific Protections in This Workplace

Employers must train employees on workplace-specific:

- Engineering controls
- Work practice controls
- Respiratory protection

Health Hazards

Respirable Crystalline Silica

Housekeeping



When cleaning silica dust, avoid:

- Dry sweeping/brushing
- Compressed air without a ventilation system to capture the dust

Health Hazards

Respirable Crystalline Silica

Housekeeping

Employers must let employees know which housekeeping methods:

- Must be used in the workplace
- Must not be used in the workplace

Health Hazards

Respirable Crystalline Silica

Written Exposure Control Plan

Employers must:

- Prepare and implement plan addressing:
 - Exposure sources
 - Controls
 - Housekeeping
 - Restricting access
- Review plan yearly
- Make it available

Health Hazards

Respirable Crystalline Silica

Competent Person

- Identifies and minimizes silica hazards
- Employees must know the competent person

Health Hazards

Respirable Crystalline Silica

More Information

[Protecting Workers from Silica Hazards in the Workplace Video - YouTube](#)



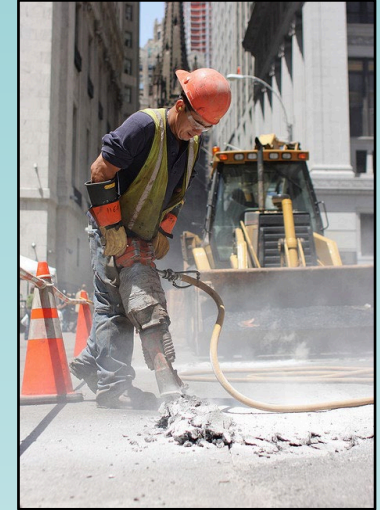
Breathe Easier

www.osha.gov/silica/

Physical Hazards in Construction

- Noise
- Temperature extremes
- Vibration
- Radiation

Noise and Vibration



Source: Nick Allen (Flickr.com)

Temperature



Source: OSHA

Radiation



Source: Alper Çuğun (Flickr.com)

Noise



Effects of Exposure to Physical Hazards

Temperature	Radiation	Vibration	Noise
Rash; cramps	Burns	Fatigue	Interferences
Exhaustion	Sickness	Strains	Stress
Stroke	Aging	Carpal tunnel	Tinnitus
Hypothermia	Cancer	HAVS	Headaches
Frostbite	DNA mutations	Raynaud's	Hearing loss

Noise

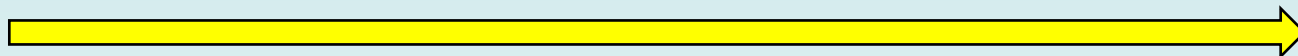
Common Construction Noise Sources	
Equipment	Noise (dB)
Backhoe	85
Bulldozer	87
Router	90
Front end loader	90
Chop saw	92
Welding equipment	92
Nail gun	97
Jackhammer	102
Grader/scrapper	107

Source: U.W. Dept. of Environmental & Occupational Health Services – Rick Neitzel July, 2005

Prolonged exposures to 85 dB can lead to hearing loss

Protection Against Physical Hazards

Hazard	Engineering Controls	Administrative Controls	PPE
Temperature	Heaters; AC; windshields; ventilation	<u>Water; rest; shade</u>	Hoods; cooling vests; hard hat liners
Vibration	Vibration reduction equipment	Train not to grip too tightly; Job rotation	Anti-vibration gloves
Noise	Silencers; mufflers; enclosures; sound barriers	Increase distance between source and worker	Ear plugs; muffs



Eliminate or substitute hazard, whenever feasible

Health Hazards

Biological Hazards in Construction

Insects



Source: James Jordan (Flickr.com)

Animals



Source: Jean-Jacques Boujot (Flickr.com)

Mold



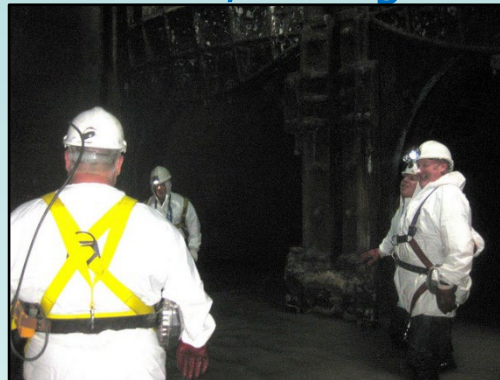
Source: OSHA

Plants



Source: OSHA

Water/Sewage



Source: Matt Brown (Flickr.com)

Blood

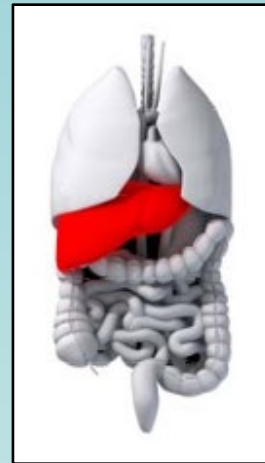


Source: Monsieur Gordon (Flickr.com)

Effects of Exposure to Biological Hazards

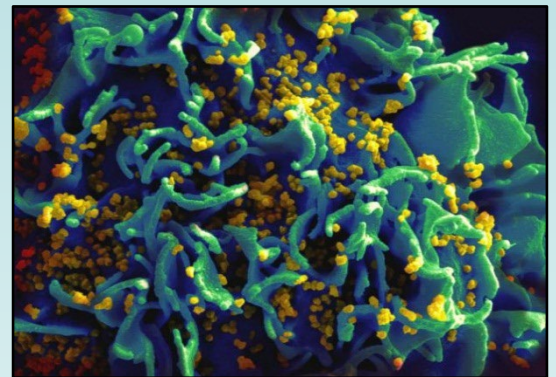
- **Mild**
 - Allergic reaction
- **Serious**
 - Tetanus
 - Swine flu
 - SARS
 - Avian flu
 - West Nile
 - Lyme disease
- **Chronic/Terminal**
 - HIV
 - Hepatitis B & C

Hepatitis C



Source: OSHA

HIV-infected H9 T cell



Source: NIAID

Protection Against Biological Hazards

- Practice precaution with:
 - Blood
 - Bodily fluids
 - Animals
 - Insects
- Personal hygiene
- Proper first aid
 - Cuts/Scratches
- Proper PPE
- Vaccinations – schedule



Source: U.S. Army Corps of Engineers

Ergonomic Hazards in Construction

- Lifting and pushing
 - Heavy
 - Awkward
 - Repetitive
- Awkward grips and postures
- Reaching
- Using wrong tool or using tool improperly
- Using excessive force
 - Overexertion



Source: OSHA

Effects of Exposure to Ergonomic Hazards

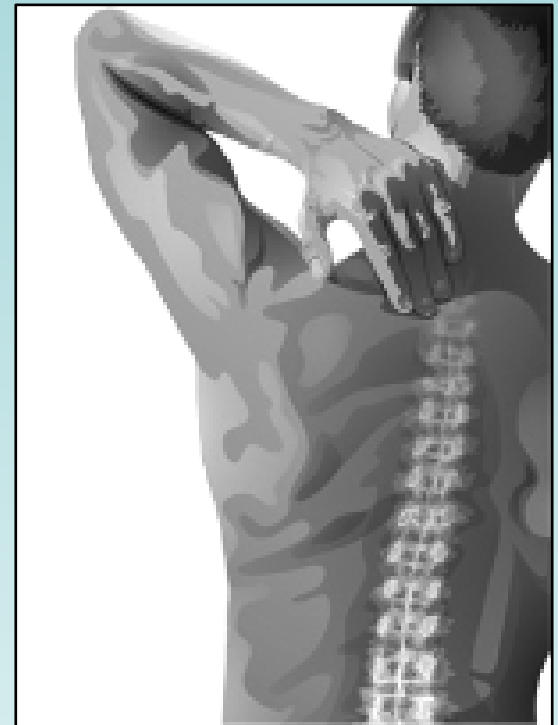
Musculoskeletal Disorders (MSDs)

- **Mild**

- Joint pain
- Swelling
- Sciatica
- Acute lower back pain

- **Serious**

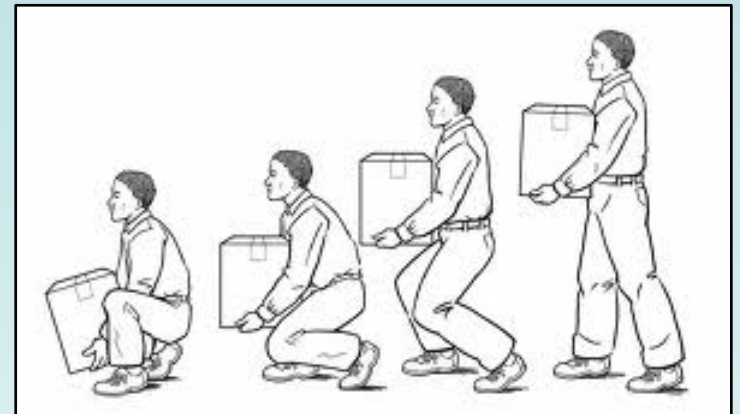
- Epicondylitis (tennis elbow)
- Raynaud's Phenomenon (white finger)
- Thoracic Outlet Syndrome
- Carpal Tunnel Syndrome
- Chronic lower back pain
- Tears (rotator cuff is common)



Source: OSHA

Protection Against Ergonomic Hazards

- Use ergonomically designed tools
- Use correct work practices
 - Proper lifting techniques
 - Work station setup
- Ask for help when handling:
 - Heavy loads
 - Bulky/Awkward materials
- Proper PPE



Source: Boston University (bu.edu/wellness/workplace/ergonomic)

Employer Requirements

- Abide by OSHA regulations
 - Permissible Exposure Limits (PELs) for all chemicals
 - Monitoring and protection programs
 - Hazard Communication Program (HAZCOM)
 - Worker right to know
 - Hazardous chemical training
 - Written plan (who, what, where)
 - Proper chemical labeling
 - SDS



Source: OSHA

Health Hazards

Multiple Health Hazards

In some cases, workers can be exposed to several health hazards at the same time or on the same worksite over time.



Source: OSHA

This worker is simultaneously exposed to noise, silica dust, vibration, and ergonomic hazards.

Hazard Communication Standard

Requirements for a written program:

- Develop, implement, and maintain a written hazard communication program
- Main intent is to ensure compliance with standard in a systematic way that coordinates all elements

Health Hazards

Hazard Communication – HAZ COM

Components of written program:

- Lists of hazardous chemicals present at worksite
- Availability of SDSs to employees and downstream employers
- Labeling of chemical containers
- Training programs regarding hazards of chemicals and protective measures

Health Hazards

Hazard Communication – HAZ COM

List of hazardous chemicals known to be present in the workplace:

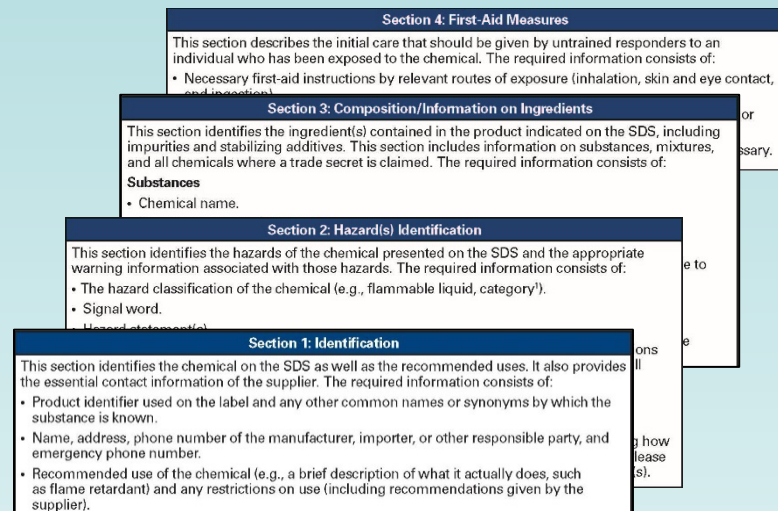
- Use product identifier
 - Product name, common name or chemical name
 - Same as name used on SDS and label
- Inventory of chemicals – employer must have available an SDS for each chemical
- Covers all chemicals in all forms, whether contained or not - liquids, solids, gases, vapors, fumes, and mists
- Include chemicals in containers, pipes, and those generated by work operations such as welding fumes and dust

Health Hazards

Hazard Communication – HAZ COM

Safety data sheet (SDS):

- Available and accessible to workers
- Required for all hazardous chemical used
- Do not use hazardous chemicals if there is no SDS available
- 16-section format



Health Hazards

Hazard Communication – HAZ COM

SDS documentation:

- Designate person(s) responsible for obtaining and maintaining SDSs
- Describe how SDSs are maintained and how employees can access them
- Procedures if SDS is not received with first shipment
- Must have SDS for each chemical; train workers on SDS format and use



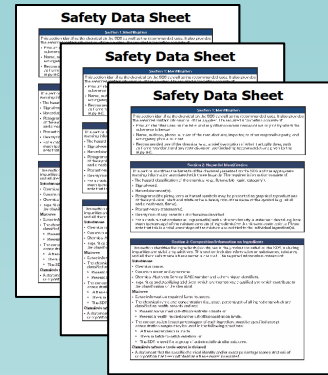
Source: OSHA

Health Hazards

Hazard Communication – HAZ COM

SDS 16-section format:

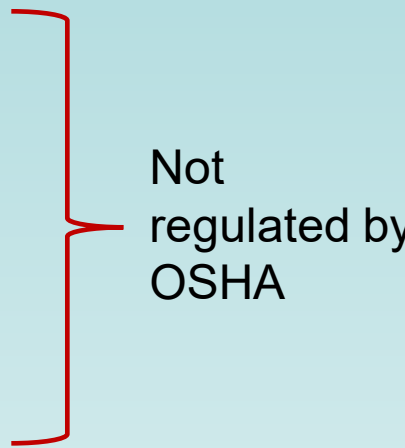
- Section 1: Identification
- Section 2: Hazard(s) identification
- Section 3: Composition/information on ingredients
- Section 4: First-aid measures
- Section 5: Fire-fighting measures
- Section 6: Accidental release measures
- Section 7: Handling and storage
- Section 8: Exposure control/personal protection



Health Hazards

Hazard Communication – HAZ COM

- Section 9: Physical and chemical properties
- Section 10: Stability and reactivity
- Section 11: Toxicological information
- ***Section 12: Ecological information***
- ***Section 13: Disposal considerations***
- ***Section 14: Transport information***
- ***Section 15: Regulatory information***
- Section 16: Other information



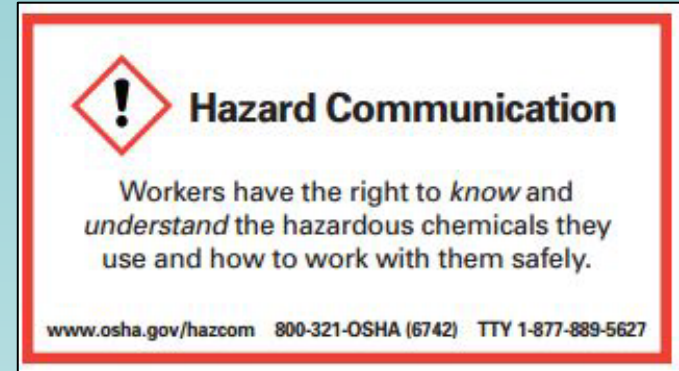
Not
regulated by
OSHA

Health Hazards

Hazard Communication – HAZ COM

Training requirements:

- Train employees on hazardous chemicals in their work area
 - Before initial assignment
 - When new hazards are introduced
 - Non-routine tasks
- Include in training
 - Methods/observations to determine presence/release of chemical in work area
 - Hazards of chemicals
 - Appropriate protective measures
 - Where and how to obtain additional information



Source: OSHA

Health Hazards

Hazard Communication Labels



Figure 3: HazCom 2012 Pictograms

<p>Health Hazard</p> <ul style="list-style-type: none"> • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity 	<p>Flame</p> <ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides 	<p>Exclamation Mark</p> <ul style="list-style-type: none"> • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
<p>Gas Cylinder</p> <ul style="list-style-type: none"> • Gases Under Pressure 	<p>Corrosion</p> <ul style="list-style-type: none"> • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals 	<p>Exploding Bomb</p> <ul style="list-style-type: none"> • Explosives • Self-Reactives • Organic Peroxides
<p>Flame Over Circle</p> <ul style="list-style-type: none"> • Oxidizers 	<p>Environment (Non-Mandatory)</p> <ul style="list-style-type: none"> • Aquatic Toxicity 	<p>Skull and Crossbones</p> <ul style="list-style-type: none"> • Acute Toxicity (fatal or toxic)

Health Hazards

Hazard Communication Labels



Figure 3: HazCom 2012 Pictograms

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Health Hazards

Hazard Communication Labels

Skull and Crossbones



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Not regulated by OSHA

ACCIDENT

A Temporary Mechanic was assigned to supervise and assist another craft that was contracted to perform “pit sealing” in a hydraulic elevator pit located in a parking garage.

The TM provided access to the pit by raising the elevator, placing pipe stands, closing and pinning the pit valve and performing lockout/ tagout.

The TM provided access to a GFCI outlet outside of the pit and remained in the vicinity near the machine room and his service vehicle.

The pit sealing crew commenced work by pouring a gallon of Acetone on the pit floor, cleaning the oil and grease from the floor.



ACCIDENT

As they began using an angle grinder to remove high spots on the pit floor, sparks ignited the Acetone vapor.

Both men caught fire from the ignition and flashback of the explosion.

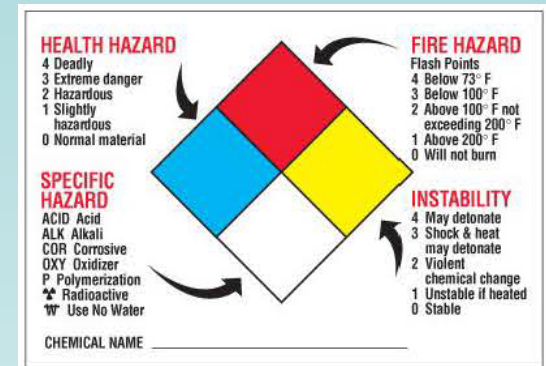
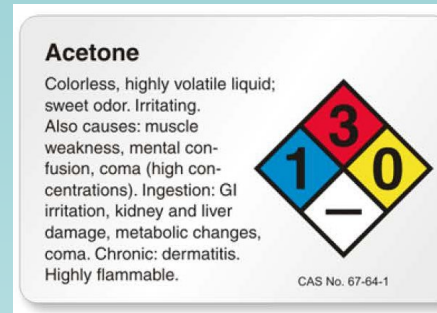
The TM heard the event, grabbed the fire extinguisher from the machine room, and extinguished the fire. He continued to assist until emergency responders arrived.



ACCIDENT

Recommendations & Lessons Learned

- Insist that your employer provides safety data sheets for chemicals used by other crafts under your control.
- Understand hazardous materials warning labels and review employer's hazardous communication program.
- Non-elevator work performed in pits by others should be continuously supervised to prevent catastrophic events from occurring
- Enroll in a confined space awareness course for a greater understanding of safe work practices in confined spaces



Knowledge Check

1. Which of the following is a common type of health hazard:
 - a. Chemical hazards
 - b. Economic hazards
 - c. Electrical hazards
 - d. Fall hazards

a. Chemical hazards

Knowledge Check

2. Which of the following is an example of a physical health hazard:
- a. Asbestos
 - b. Noise
 - c. Silica
 - d. Lead

b. Noise

Knowledge Check

3. Which is an appropriate engineering control for protection against noise exposures:
- a. Audiograms
 - b. Earplugs
 - c. Increasing distance between source
 - d. Constructing sound barriers

d. Constructing sound barriers

Knowledge Check

4. Which is a requirement of the employer:
 - a. Determine if workers' exposures exceed OSHA PELs
 - b. Perform medical evaluations on all employees
 - c. Develop silica training programs for all employees
 - d. Provide all workers with safety toe protective footwear

a. Determine if workers exposures exceed OSHA PELs

Knowledge Check

1. A hazard communication program requires which of the following components?
 - a. Written program
 - b. SDS/labeling
 - c. Training
 - d. All of the above

Answer: d. All of the above

Knowledge Check

2. How many sections are required on an SDS?
- a. 11 sections
 - b. 16 sections
 - c. 4 sections
 - d. As many as necessary to convey understanding

Answer: b. 16 sections

Health Hazards

Through the Alliance between OSHA's 10 Regional Offices and the Elevator Contractors of America (ECA), Elevator Industry Work Preservation Fund (EIWPF), International Union of Elevator Constructors (IUEC), National Association of Elevator Contractors (NAEC), National Elevator Industry Educational Program (NEIEP), and National Elevator Industry Inc. (NEII), collectively known as The Elevator Industry Safety Partners, developed this Industry Specific Training for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor. May 2021

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Health Hazards in Construction

