Are Our Shops Safe?

(from Heat Illness & Injury Risks)

AMERICAN BUS ASSOCIATION

Representing the motorcoach, tour and travel industry

BUS industry SAFETY council

Brought to you by **ABC Companies**

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Vice Chairperson BISC

MARTZ BUS EST. 1908

Thermoregulation

Your body works to keep your inner temperature at 98.6 degrees F in a process called **thermoregulation.**

Thermoregulation occurs in both **heat** and cold.

Amount of heat that stays stored in you depends on:

- ✓ **Environment**
- ✓ **Level of Physical activity**
- ✓ **Type of work**
- ✓ **Time spent working**
- ✓ **Number & length of breaks between work periods**

Thermoregulation

Thermoregulation occurs four ways:

- **Conduction –** transfers body heat to objects colder or warmer that your body
- **Convection –** transfers body heat to air moving over your skin
- **Radiation** – transfer heat to or from objects not in direct contact with your body
- **Evaporation –** cools body heat by air or moisture exiting lungs or skin

In **radiation**, **conduction** and **convection**, your blood vessels expand carrying internal body heat to your skin for release to the air**.**

In **evaporation,** perspiration cools on your skin releasing heat to the air**.**

Thermoregulation

Thermoregulation is hindered – minor **heat** disorder such as sunburn or **heat** rash

Thermoregulation breaks down – may suffer major **heat** disorders such as **heat** cramps, **heat** exhaustion or **heat** stroke

Amount and rate of heat gain or loss depends on:

- Air temperature - measured by a normal thermometer
- Temperature of surrounding objects – radiant heat from sun or equipment
- Air movement (caused by wind or fans)
- Humidity (% of water vapor in the air)
- Clothing worn – number or layers & thermal efficiency of clothing & where it is worn on body
- Personal Protective Equipment – e.g., respiratory protection may increase effort breathing
- Physical activity – hard or modest work increases the **heat** within the body
- Medical state of the individual and body mass – age, gender, acclimatization, hydrated state (% of liquid in body) possible medical conditions, medication being taken and level of fitness

Time exposed to temperature – both in total and short bursts and rest period

Thermoregulation

- When environmental temperature is higher than your body temperature YOU absorb **heat** resulting in your temperature increasing and the body's cooling system activating to prevent damage by:

- Blood vessels expand to carry **heat** to your skin surface for release to the air
- Your pulse rate rises, adding strain to heart and circulatory systems
- Perspiration flows to your skin to evaporate

Heat Index

The **heat** index is the "feels like" temperature.

As relative humidity increases, the air seems warmer than it actually is because the body is less able to cool itself via evaporation of perspiration.

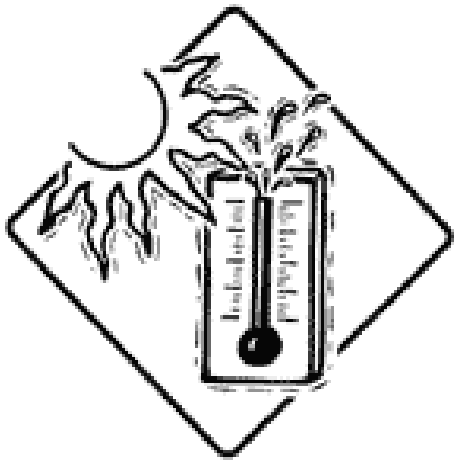
Heat Index

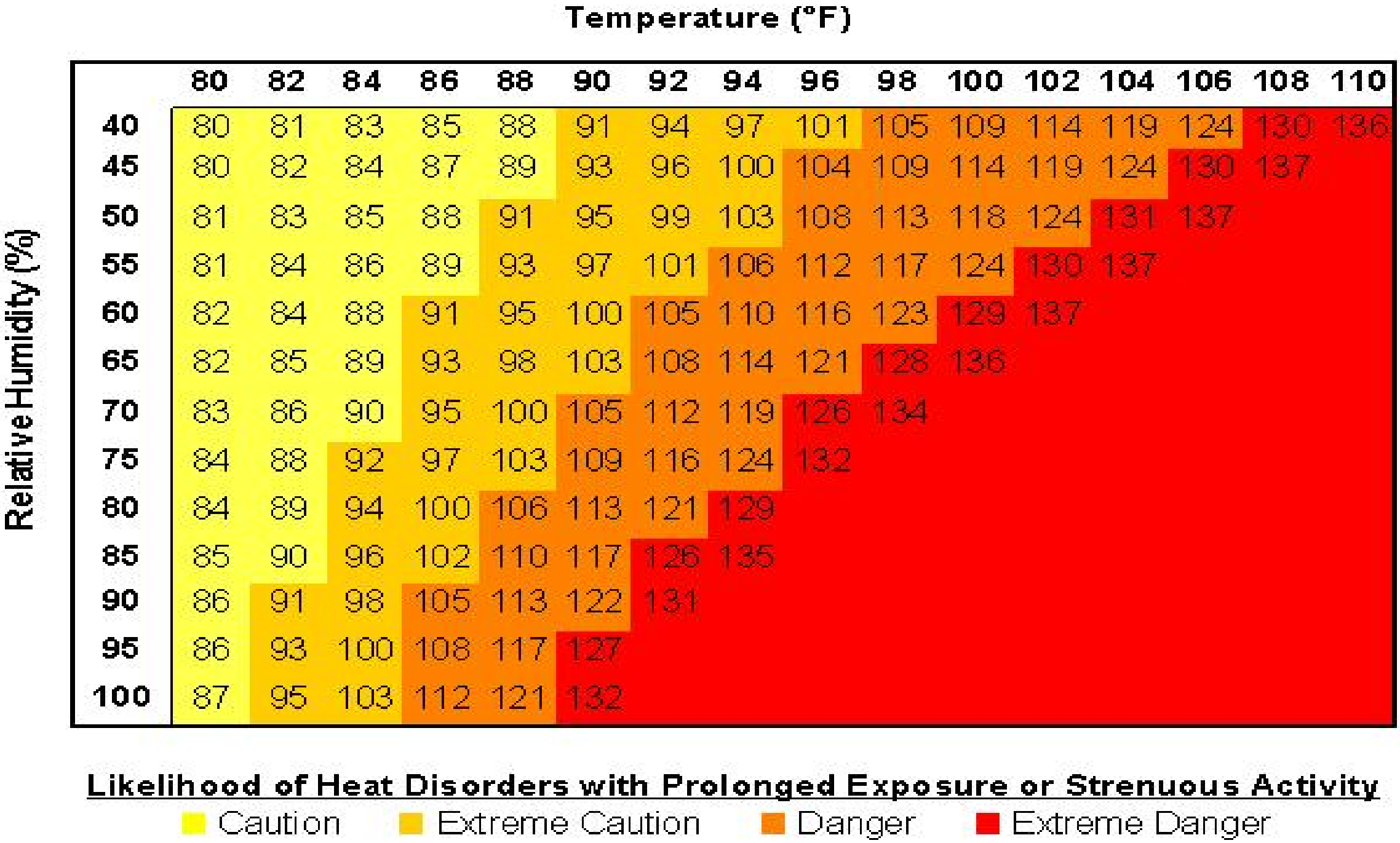
As the **heat** index rises, so do health risks:

Heat index is 90°-103°F	heat exhaustion is possible.
Heat index above 103°F	heat exhaustion is probable.
Heat index > 125°F	heatstroke is possible.
Heat index > 130°F	heatstroke very likely.

Physical activity and prolonged exposure to the sun or **heat** increase the risks.

The **Heat** Index Table (next slide) uses the Dry Bulb temperature and the Relative Humidity to determine the **Heat** Index.




Temperature (°F)
Relative Humidity (%)
80 82 84 86 88 90 92 94 96 98 100 102 104 106 108 110
40 80 81 83 85 88 91 94 97 101 105 109 114 119 124 130 136
45 80 82 84 87 89 93 96 100 104 109 114 119 124 130 137
50 81 83 85 88 91 95 99 103 108 113 118 124 131 137
55 81 84 86 89 93 97 101 106 112 117 124 130 137
60 82 84 88 91 95 100 105 110 116 123 129 137
65 82 85 89 93 98 103 108 114 121 128 136
70 83 86 90 95 100 105 112 119 126 134
75 84 88 92 97 103 109 116 124 132
80 84 89 94 100 106 113 121 129
85 85 90 96 102 110 117 126 135
90 86 91 98 105 113 122 131
95 86 93 100 108 117 127
100 87 95 103 112 121 132
Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity
Caution
Extreme Caution
Danger
Extreme Danger

Wet Bulb Global Thermometer

Heat index >90 to 103°F

Minor Heat-Stress Disorders

Heat Rash (Prickly heat) – occurs in humid conditions . To prevent heat rash:

- Keep skin dry and clean
- Wear loose-fitting clothing

Sunburn – can stop your body from thermoregulating efficiently. To minimize harmful sun exposure:

- Apply sunscreen both before and during work in the sun
- Work in the shade whenever possible
- If you are sunburned, stay out of the sun as much as possible.

Perspiration and Mineral Loss – glands secrete salts and water onto your skin for evaporative cooling

- Drink at least 7 ounces of water every 15 to 20 minutes or risk dehydration
- Drink lightly salted liquids (watch if you have medical conditions pertaining to salt intake)

Major Heat-Stress Disorders

If your body warns you to cool down and you ignore it, hyperthermia increases until you risk permanent damage.

Heat Cramps – severe muscle cramps, fluids depleted through perspiration or decreased mineral content.

If you or co-worker is suffering from **heat** cramps:

- Move into the shade
- Drink lightly (1 percent) salted water

Heat Exhaustion – thermoregulation is overwhelmed but not completely broken down.

MUST receive medical attention.

Heat exhaustion symptoms may include:

- Clammy, cool, moist and pale skin
- Fatigue or weakness
- Heavy perspiration
- Intense thirst from dehydration
- Clouded senses or impaired judgement
- Fainting or lose of coordination
- Loss of appetite
- Nausea or vomiting
- Rapid breathing

If you suspect Heat exhaustion:

- **Call 911**
- Move the victim into the shade
- Remove or loosen clothing and boots
- Fan the victim
- Elevate the victim's legs
- Massage the victim's legs
- Give the victim lightly salted water
- Pour water and ice on the victim
- Stay until medical help arrives

Major Heat-Stress Disorders

Heat Stroke – most severe of **heat** disorders, life-threatening emergency requires **immediate medical attention**

Early symptoms:

- High body temperature
- No perspiration on skin
- Hot, red or flushed skin
- Rapid pulse
- Difficulty breathing
- Constricted pupils
- High blood pressure
- Headache or dizziness
- Confusion or disorientation
- Weakness
- Nausea or vomiting

Advanced symptoms:

- Seizures or convulsions
- Collapse
- Loss of consciousness
- Deep coma
- No detectable pulse
- Body temperature over 103 degrees F

If you suspect heat stroke:

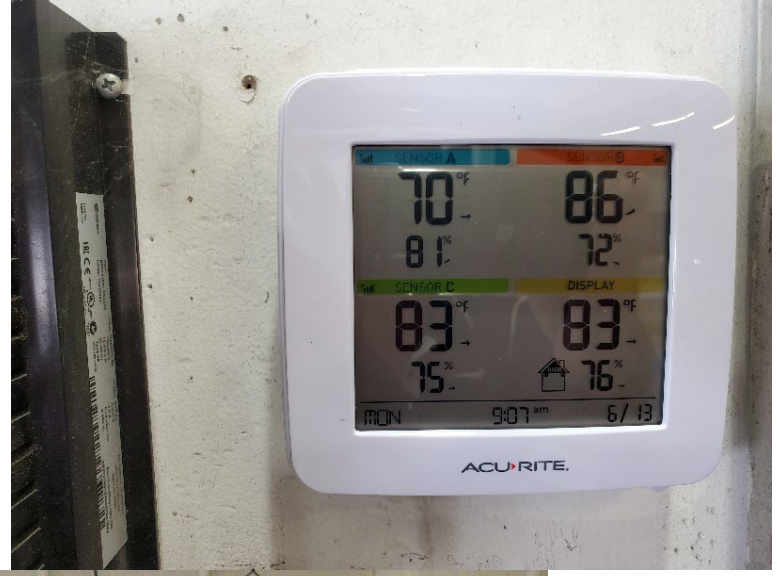
- Lower victim's body temperature as quickly as possible
- Complete immersion in water or apply ice packs to armpits, elbows, wrists or backs of knees may help.
- Call 911 immediately

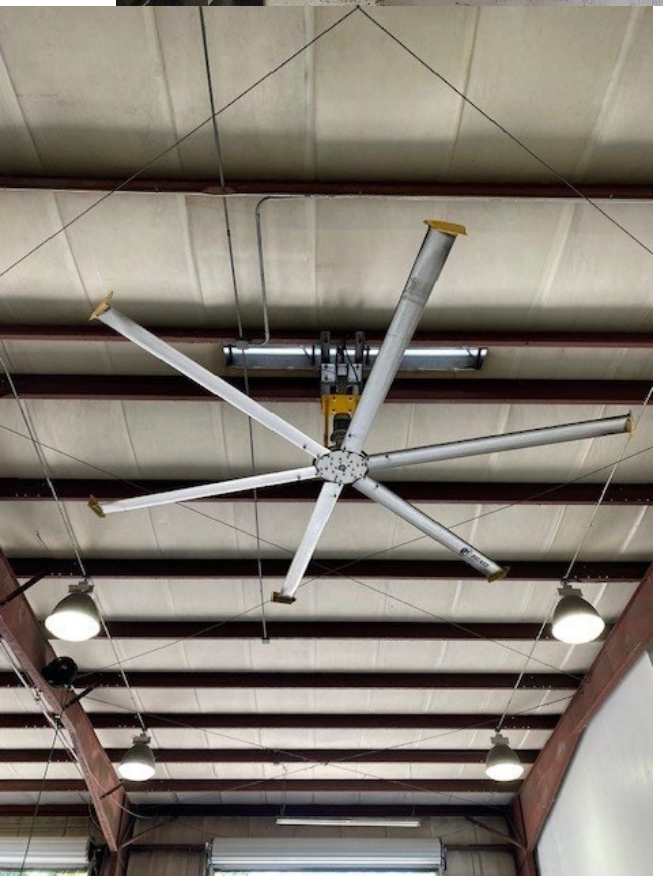
Controlling Heat Stress

Acclimatization – development of the ability to work in a hot environment by gradually getting yourself used to the conditions. In order to acclimate safely you should be in good physical condition. Some reach full acclimatization within a week. Others may take longer.

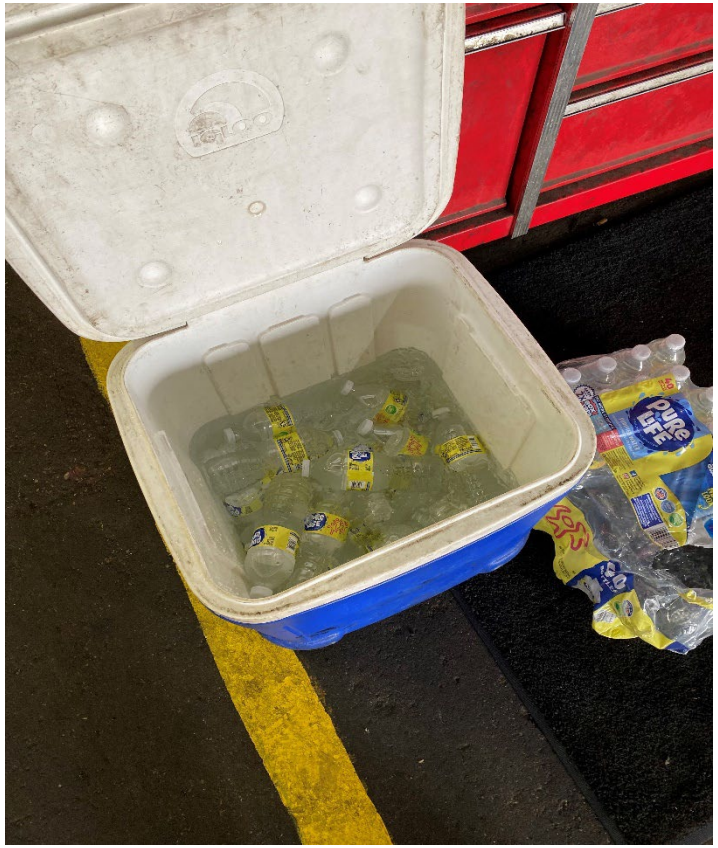
Work/Rest Cycles – proper work procedures to reduce ill effects of heat stress involve scheduled work/rest cycles that keep you from overdoing it. Rest means minimal activity, not halting work completely.

Food and Water Intake – fluid replacement is the most important way to protect your body's Thermoregulation system. You must take in as much fluid as you lose during the day and replace salts your body uses up in cooling. **NEVER** drink alcohol beverages since alcohol dehydrates the body.


SENSOR A
SENSOR B
70 °F
81 %
86 °F
72 %
SENSOR C
DISPLAY
83 °F
75 %
83 °F
76 %
MON
9:07 am
6/13
ACURITE




BIGASS




POWER
BREEZER


PORTACOOL


PORTACOOL


ULINE

Incidents Due to Heat Stress

Direct causes of incidents include:

- Dizziness or fainting
- Fogged glasses
- Slippery hands
- Perspiration in the eyes

Indirect causes of incidents include:

- Loss of attention to the job
- Irritability and anger
- Fatigue
- Poor judgement
- Slower mental and physical reactions

Summary

To work safely in hot environments:

- Be aware of environmental heat and its consequences
- Take in enough fluid and minerals to prevent hyperthermia
- Follow suggested work/rest cycles until you are fully acclimated to the environment.
- If you or a co-worker suffer symptoms of heat stress, follow accepted first-aid procedures.

Risk Assessments **Job Safety Analysis**

Your Maintenance Shop
And Safety Recommendations

Forklifts

OSHA 29 CFR 1910.178/ANSI B56.1 (2020)
Powered Industrial Trucks

Forklift Maintenance

- Perform preventive maintenance according to manufacturer's scheduled recommendations.
- OSHA requires all forklifts be examined at least daily before being placed in service. Forklifts used on a round-the-clock basis must be examined after each shift.
- The operator should conduct a pre-start visual check with the key off and then perform an operational check with the engine running.
- The forklift should not be placed into service if the vehicle is not be safe to operate. (**Red Tag** – Do Not Operate)

Forklift Maintenance

- **Remember!** A vehicle in need of repair, defective or in any way unsafe, should **not be** driven and removed from service immediately.

- Any problems should be recorded on the Daily Inspection Sheet and reported to a supervisor.

Forklift: Daily Inspection Checklist				
Operators Name				
Starting Hour Meter Reading		**Ending Hours Meter Reading**		
Truck Number		**Date**		
Check boxes as follows: Explain below		**Satisfactory**	**Unsatisfactory**	**N/A**
KEY OFF Procedures				
Vehicle Inspection				
• Overhead guard				
• Hydraulic cylinders				
• Mast assembly				
• Lift chains and rollers				
• Forks				
• Tires				
• LPG tank, hose and locator pin				
• Gas gauge				
Check the Data plate				
Examine the battery				
Check the fluid level				
KEY ON Procedures				
Test the front, tail, and brake lights				
ENGINE RUNNING Procedures				
Check the gauges				
• Oil pressure indicator lamp				
• Ammeter indicator lamp				
• Hour meter				
• Water temperature gauge				
Test the standard equipment				
• Steering				
• Brakes				
• Horn				
• Seat brake				
Check the operation of load-handling attachments				
Check the transmission fluid level				
Check each of the following items. Let your supervisor and/or maintenance department know of any problems. DO NOT operate a faulty truck!				
Additional Comments:				

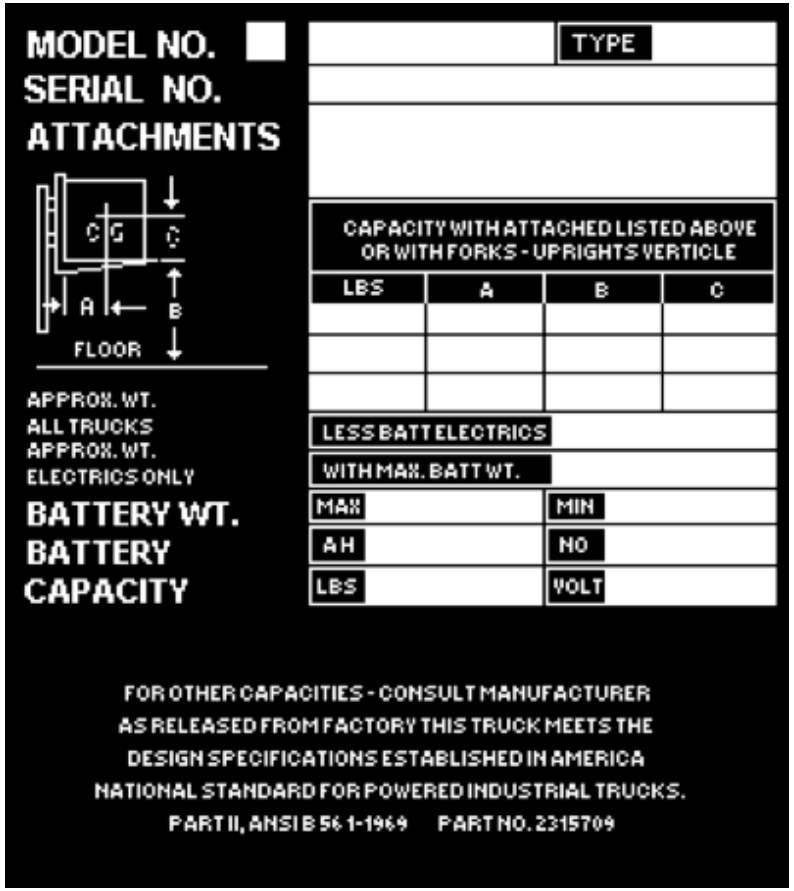
Forklift Dataplates

Data Plate Information

- Type
- Capacity
- Load Center
- Truck Weight

Regulations

- Dataplates and markings must be in place and legible
- All modifications and additions which affect the safe operation and capacity must be approved by the manufacturer



Forklift Attachments

- Using an unapproved attachment could alter the forklift's lifting and balance characteristics and lead to a forklift overturning.
- Whenever an attachment is used that could affect the capacity or safe operation of a forklift, its use must be approved by the forklift manufacturer.
- Attachment information should be included on the forklift dataplate.

"**Fall protection**" is required while working in the man basket

Warning and Safety Devices

Powered industrial trucks must be equipped with the following safety devices:

- Seatbelts
- Horns
- Fire Extinguishers
- Overhead Guard

May be equipped with:

- Backup Alarms
- Warning Lights
- Mirrors
- Directional and Brake Lights

Fueling

Liquid Petroleum Gas

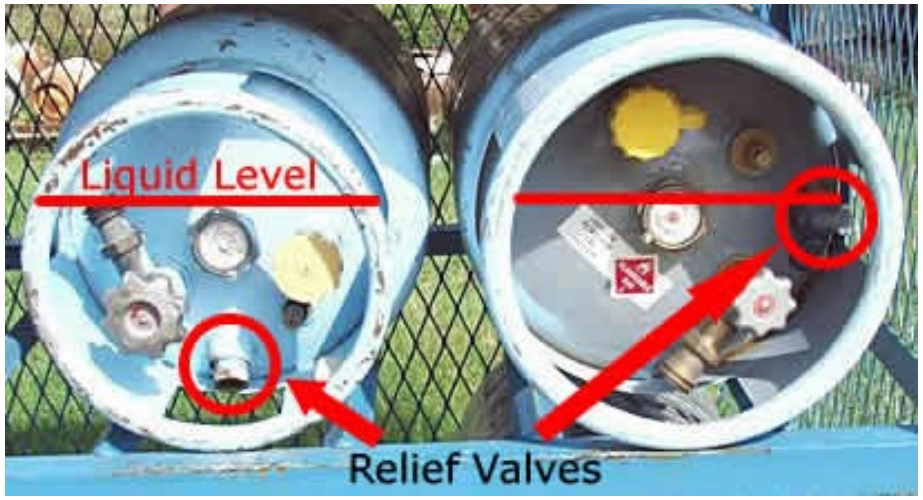
Storage

- Store tanks in dry, well-ventilated areas.
- Protect cylinders from physical damage.
- Keep away from ignition sources and oxidizers.
- Do not store near exits, stairways, and areas with potential for excessive temperatures
- Use first-in/first-out method of usage
- Separate full and empty cylinders.
- Do not drag, roll, slide, or drop cylinders.

OSHA 29 CFR 1910.110
Storage and Handling of Liquified Petroleum Gases

Fueling

- No smoking in storage area
- Storing propane in doors is not advisable
- Store tanks with the relief valves in communication with the vapor area



https://www.youtube.com/watch?v=z39r0aHkxIU

Training Requirements

Refresher training is conducted to ensure the operator has the knowledge and skills needed to safely operate the powered industrial truck.

Refresher training is to be provided when:

- Observed unsafe operation of vehicle
- Driver involved in an accident or incident
- A driver evaluation indicates a need for retraining
- The driver is assigned a different type of truck.
- A condition in the workplace changes that could affect safe operation of the truck.

Performance evaluated at least once every three years

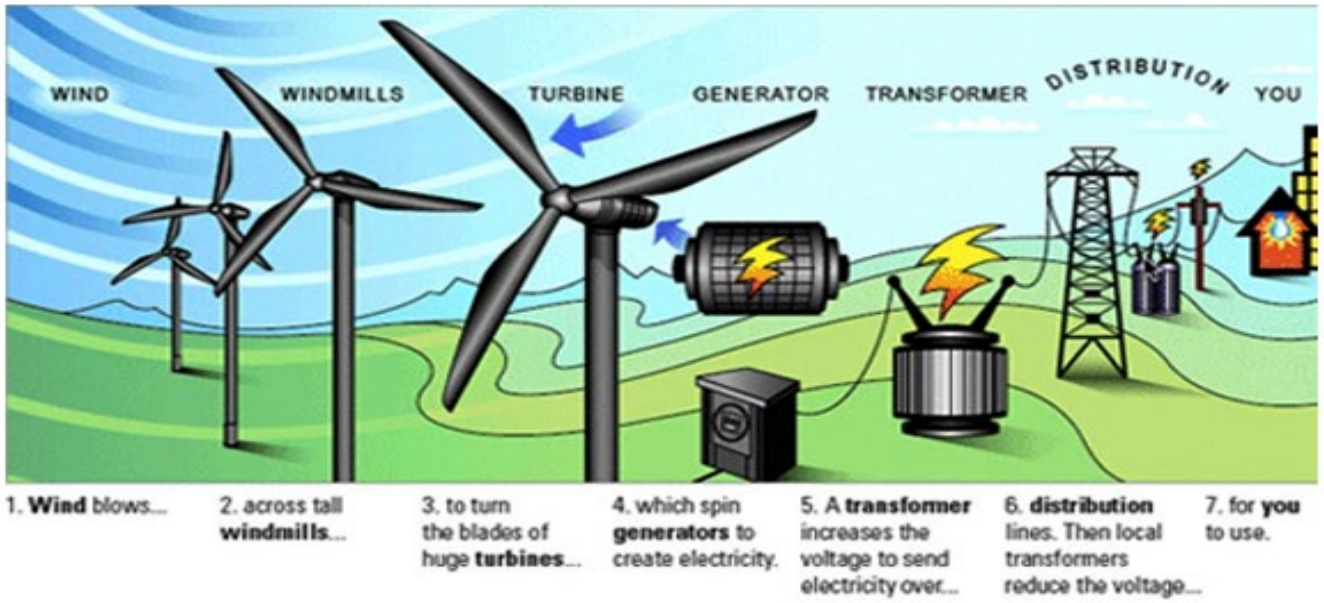
Lock, Tag and Try

(Lock out/Tag-out)

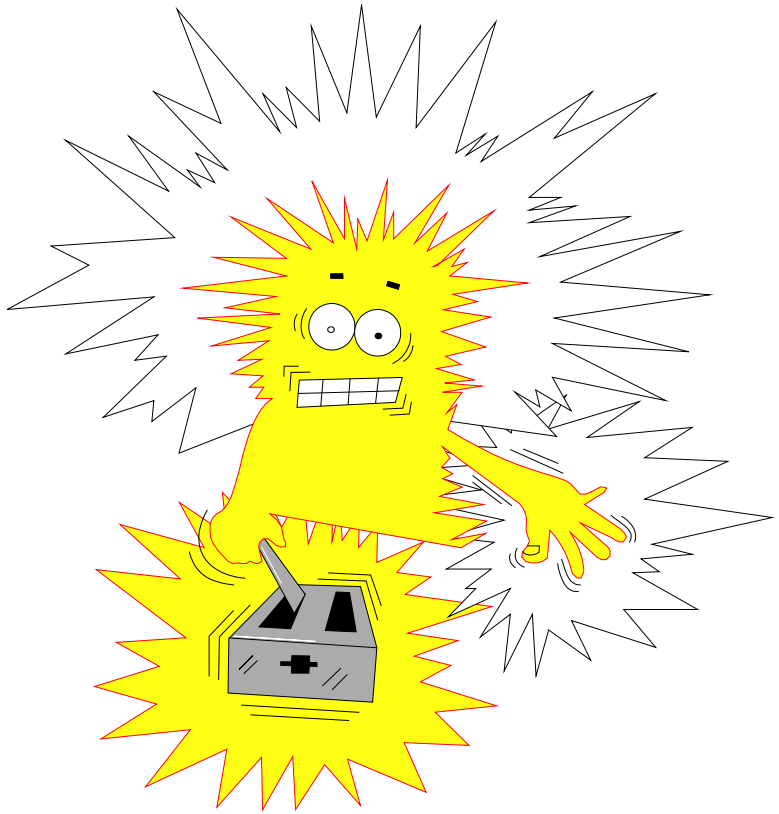
OSHA 29 CFR 1910.147
Control of Hazardous Energy

Definitions . . .

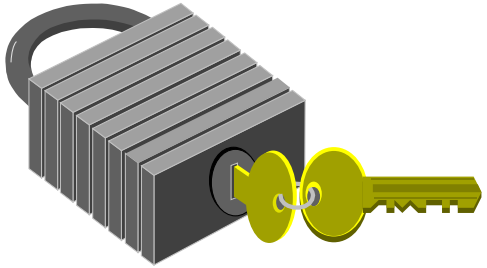
Energy Source - any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gas, water, steam, air or gravity.



Energized - when the equipment is still connected to any energy source or contains residual pressure or stored energy.



Lockout - **isolating** an energy source & **locking** the isolating device in the "off" or "safe" position.



Tagout - isolating an energy source *and/or* communicating a condition *or* situation.

Try - testing the energy state and administrative controls to ensure zero energy state.

- **Authorized employee** - an individual who uses the Lock, Tag & Try procedure on a machine or piece of equipment that is to be serviced or maintained.

- **Affected employee** - an individual whose job requires him/her to operate or use a machine or piece of equipment on which servicing, or maintenance is being performed under the Lock, Tag & Try procedure.

  This also pertains to any employee whose job requires him/her to work in an area where servicing or maintenance is being performed.

An **authorized** employee and an **affected** employee may be the same person when the affected employee's duties also include performing maintenance or service on a machine or equipment that requires use of the Lock, Tag & Try procedure.

Hardware

- Locks
- Tags
- Plastic Ties
- Hasps
- Lockout Valves
- Circuit Breakers

Lockout, Tag-out stations


DANGER
DO NOT OPERATE
S806
4mm x 6' (1.6m)
Adjustable Lockout Hasp
X
Wire cable NOT approved for
Lock out purposes!

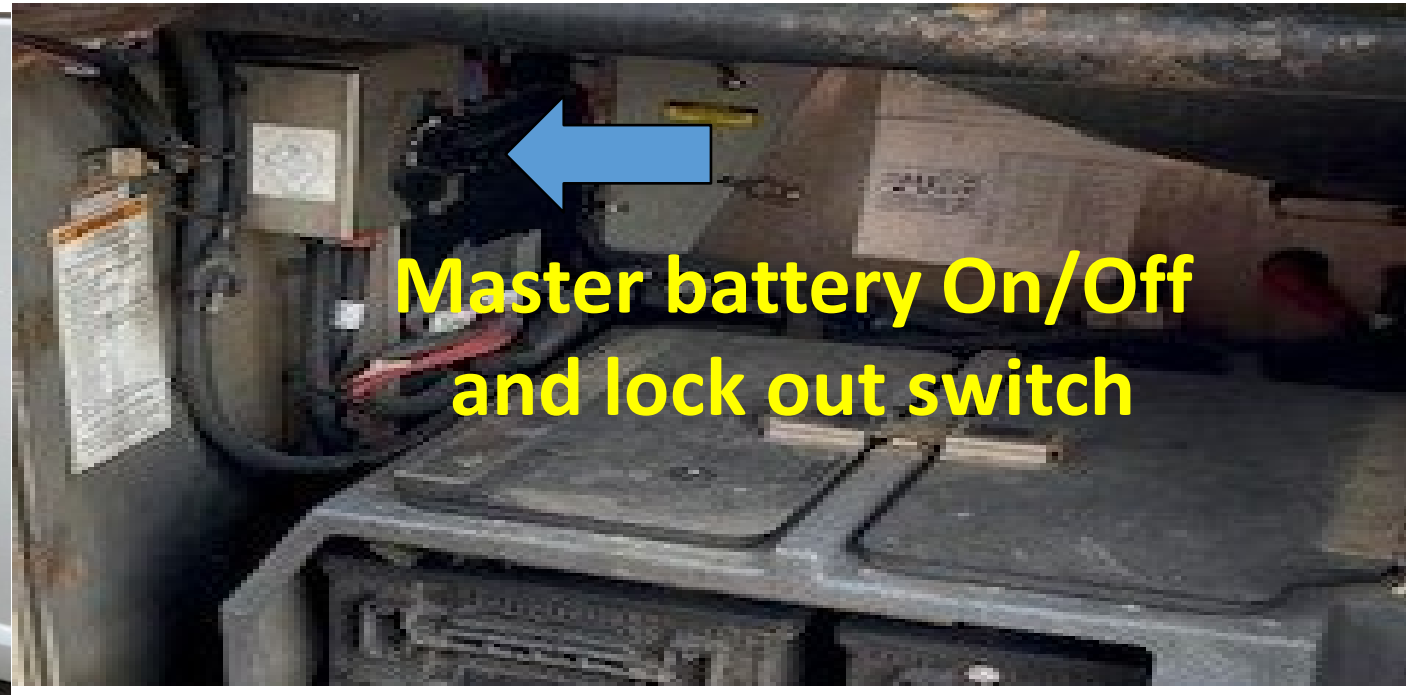
Locks

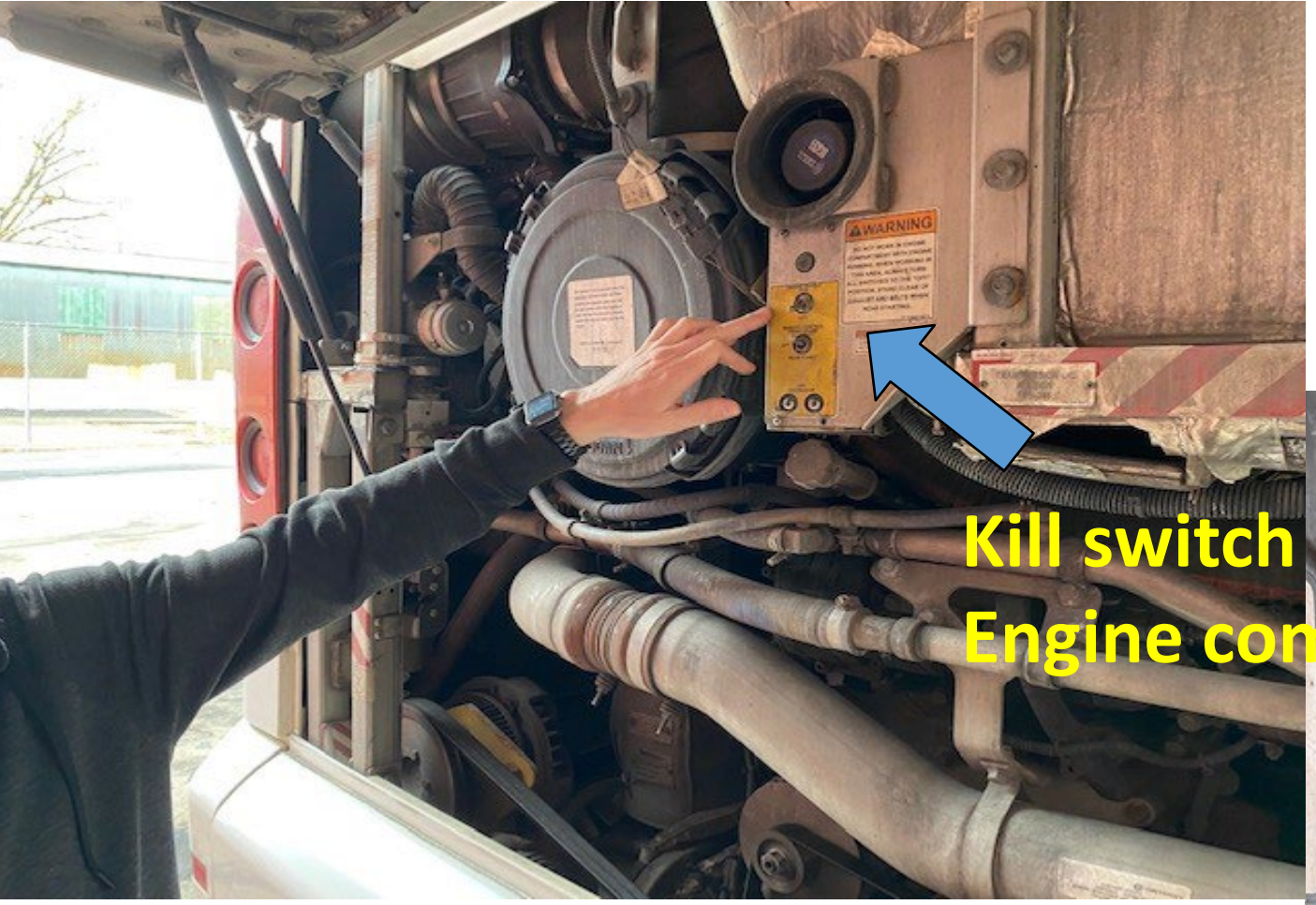
- Differentiate LOTO devices (locks and tags) from similar devices used for other purposes.
- Standardize LO devices (locks) by color, shape or size and TO devices (tags) by color, shape, format and print.
- User must be identified on the devices.
- “Do Not Operate” or “Do Not Energize”

One Person, One Lock, One Key

Lock/Tag/Try for Bus Maintenance

Shift the Transmission to Neutral & set Parking Brake
Remove key (or turn off switch)
Key placed in Authorized employee's pocket
Master battery switch turned off (locked)
Engine enable switch in rear junction box turned off





Kill switch in rear
Engine compartment

Vehicle Out Of Service

Tag Placed Over Steering Wheel

Confined Spaces

Permit-Required Confined Spaces

According to OSHA, a confined space requires a permit when it:

- Contains or has the potential to contain a hazardous atmosphere (like carbon monoxide, smoke, hydrogen sulfide, and others)
- Contains a material that has the potential to engulf an Entrant (like water or sand)
- Has an internal configuration (like walls that converge inward or floors that slope downward) that can cause an Entrant to become trapped or asphyxiated
- Contains any other recognized SERIOUS safety and health hazards (such as unguarded machines that can start up again, electrical hazards such as exposed wiring, and areas that are extremely hot or extremely cold)

Non-Permit-Required Confined Spaces

As opposed to confined spaces that require a permit to allow entry and operation, non-permit-required confined spaces do not contain or have the potential to contain a serious hazard that can cause serious harm or death. Examples of these types of spaces include crawl spaces under a house and ventilated tunnels.

OSHA 29 CFR 1910.146
Permitted Required Confined Spaces


DANGER
CONFINED SPACE
ENTER BY
PERMIT ONLY


DANGER
CONFINED SPACE
ENTER BY
PERMIT ONLY

Housekeeping

- **75%** of injury cases when the investigation is complete can be attributed to housekeeping.
- According to OSHA, good housekeeping implies a workplace is kept in an organized, uncluttered and hazard free condition.
- Safe work environments lead to healthier workers, higher worker morale, and increased productivity.
- To some the word “housekeeping” calls to mind cleaning floors and surfaces, removing dust, and organizing clutter. But in the work environment it means much more. Housekeeping is crucial to safe workplaces.

- Report and clean up spills and leaks
- Keep aisles and exits clear of items
- Consider installing mirrors & warning signs to help with blind spots
- Replace worn, ripped or damaged flooring
- Consider installing anti-slip flooring in areas that can’t always be cleaned
- Use drip pans and guards
- Eliminate slippery conditions, such as snow, ice, oil and grease for walkways and working surfaces as necessary.

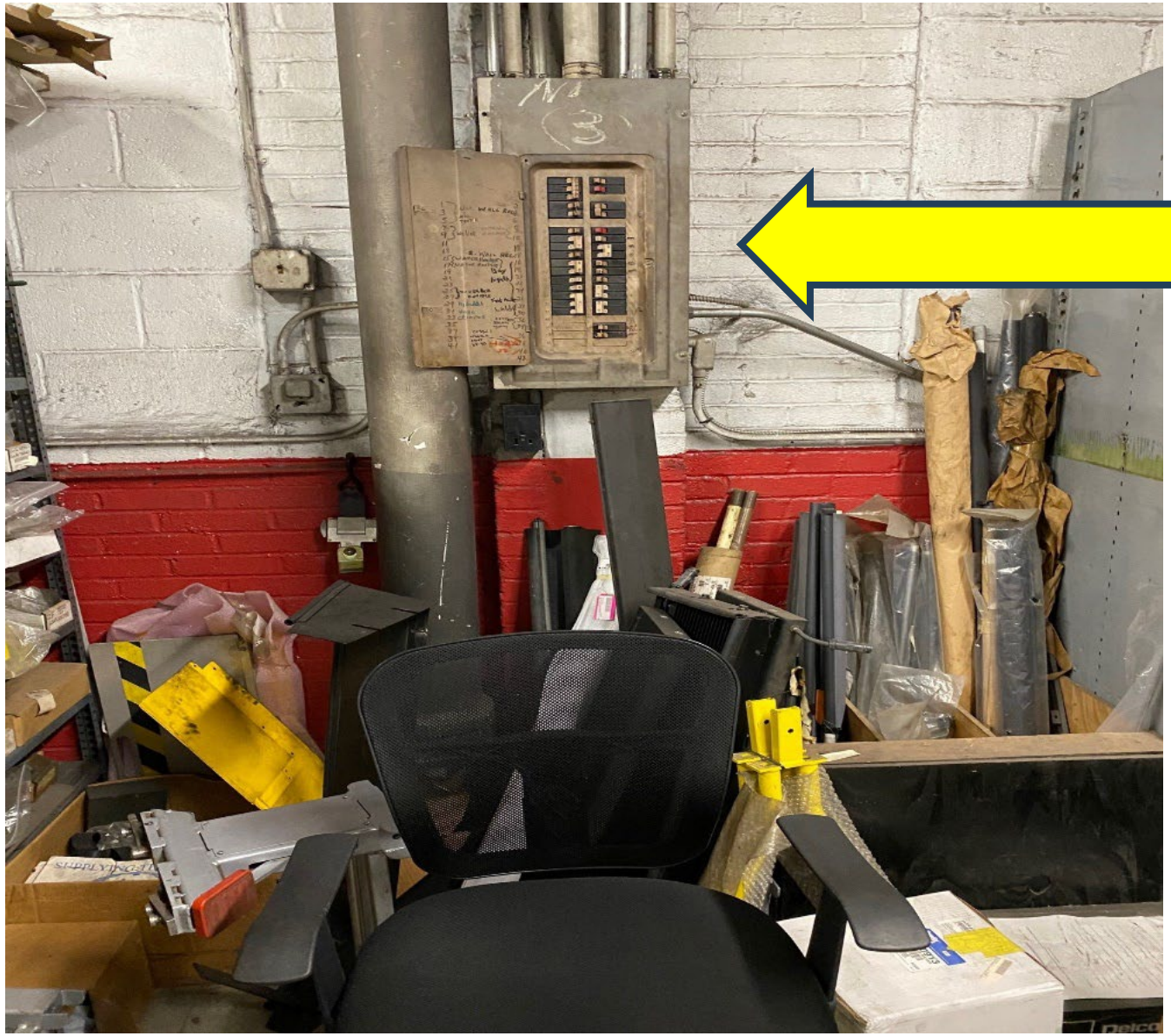
- Keep flammable materials in the work area only in the amounts necessary for the job. When they are unneeded (weekend), move them to assigned safe storage area.
- Store quick-burning, flammable materials in designated locations away from ignition sources.
- Avoid contaminating clothes with flammable liquids. Change clothes if contamination occurs.
- Keep passageways and fire doors free of obstructions.
- Stairwell doors should be kept closed . Do not store items in stairwells.

- Keep materials at least 18 inches away from automatic sprinklers, fire extinguishers, and sprinkler controls. 18 inches is required, but 24 to 36 inches is recommended.
- Clearance of 3 feet is required between piled material and the ceiling. If stock is piled more than 15 feet high, clearance should be doubled.
- Hazards in electrical areas should be reported, and work orders should be issued to fix them.


HIGH-STRENGTH
CONCRETE
MIX
80

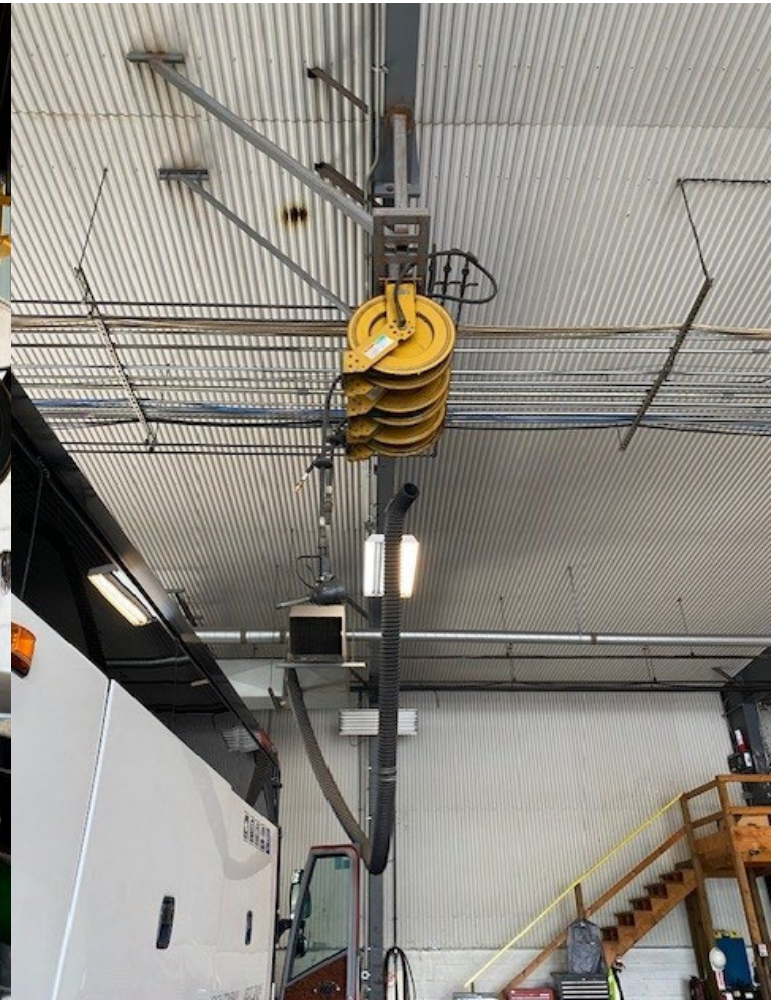

FLAMMABLE
INFLAMABLE
INFLAMABLE
PARTS
GUARD


NO SMO

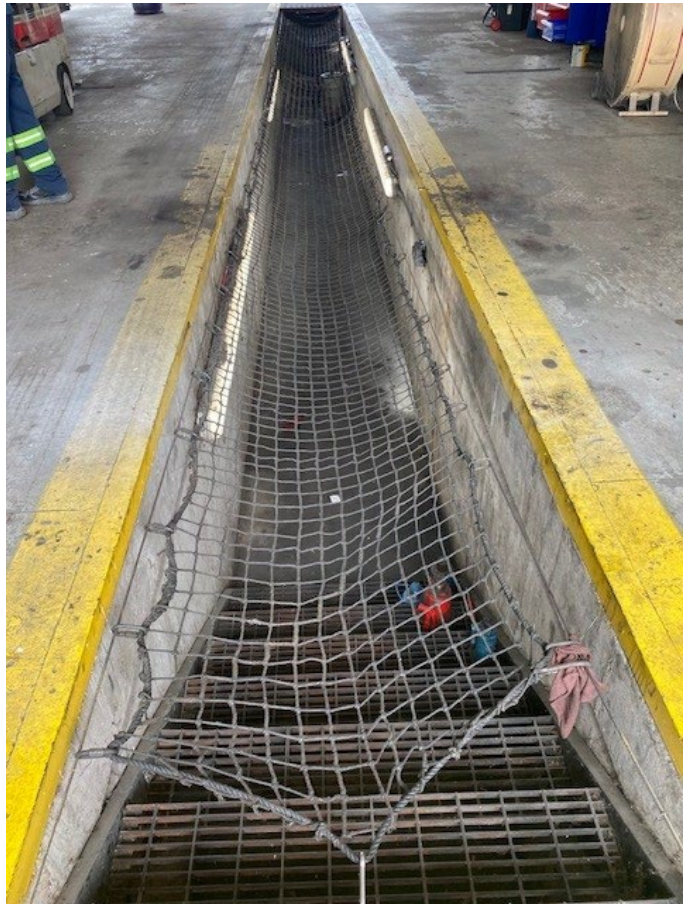


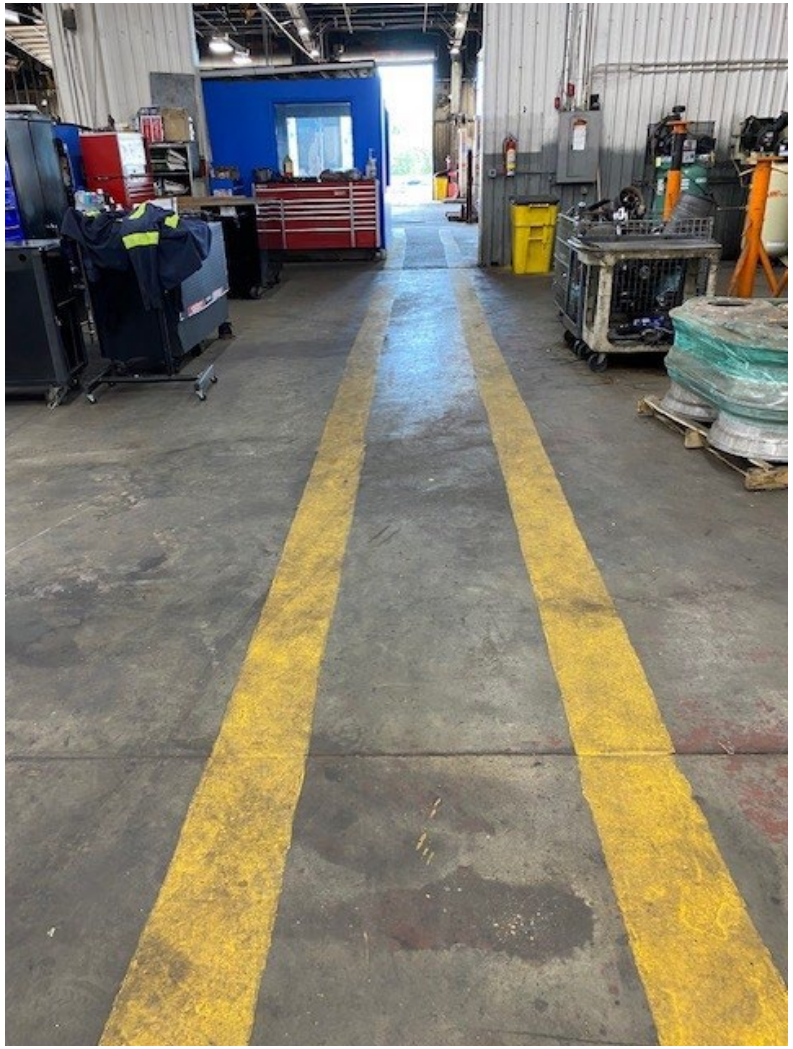
Electrical panel blocked and open

OSHA 29 CFR 1910 Subpart S Electrical



OSHA 29 CFR 1910.23
Ladders

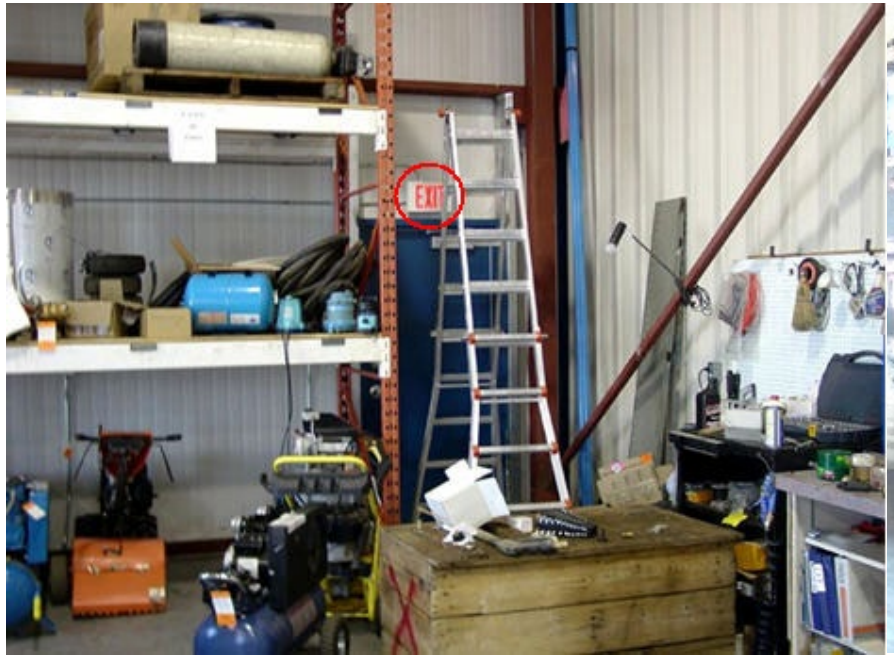




OSHA 29 CFR 1910.22
Walking/Working Surfaces

Exit Routes

- Exits routes must be free and unobstructed
- No materials or equipment may be placed, either permanently or temporarily, within the exit route.
- Keep exit routes free of flammables and combustibles



OSHA 29 CFR 1910 Subpart E
Exit Routes and Emergency Planning

Exit Doors

- When occupied, must be able to always open from the inside without keys, tools, or special knowledge
- Device such as a panic bar that locks only from the outside is permitted

Imperial Food Products
Hamlet, N.C. 9/1991

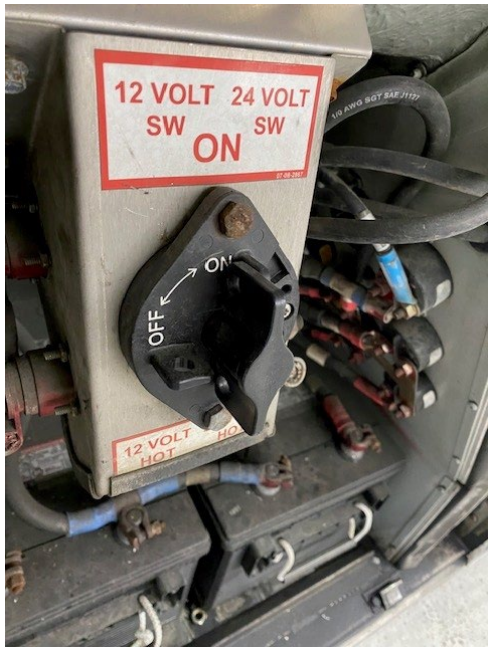
OSHA 29 CFR 1910.151(c); ANSI Z358.1
Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.


Parts Room


stertil KONI
18500 lbs
Annual Certification


FIRE ALARM
EVACUATION ALARM
CD ALARM
FIRE ALARM
FALCON
MANUAL EMERGENCY
HORN
for
emergency
access
PULL HANDLE

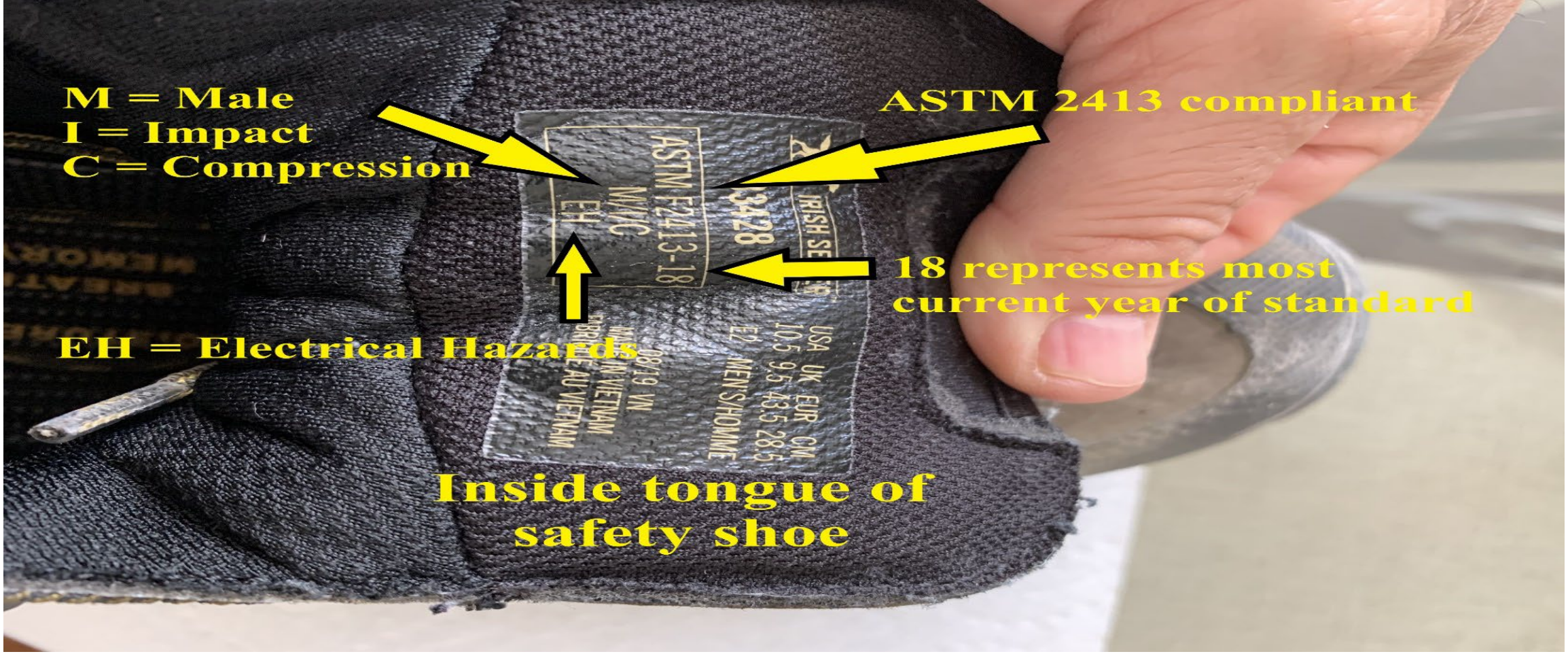

Storing heavy equipment
Tire storage


12 VOLT SW
24 VOLT SW
ON
OFF
ON
12 VOLT HOT


FUELMASTER

Personal Protective Equipment

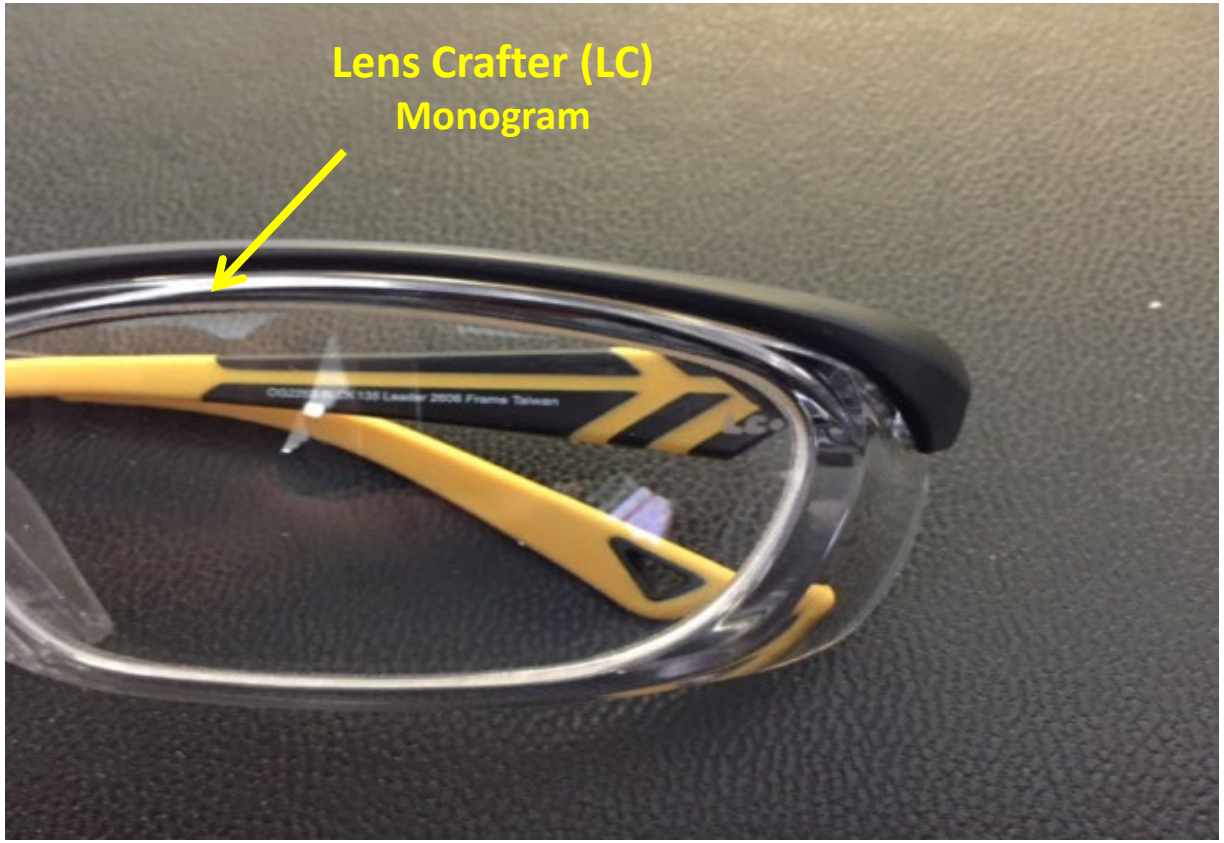
- PPE hazard assessment must be conducted (insurance carrier).
- Make sure you wear the proper PPE for every job task based on the potential risks.
- Make sure the PPE is in good working condition and properly fits the employee wearing it.
- Wear PPE when cleaning up spills or other materials, such as broken glass or wood.
- Wear safety shoes (steel or composite toed) and safety glasses (Rx if necessary) – while performing housekeeping tasks.
- Regularly inspect, clean and fix tools. Remove any damages tools from your work area.



- **M – Male based safety shoes**
- **F – Female based safety shoes**
- **I – indicative of falling or dropping objects I/75 means 75ft.-lbs. force on toes of shoe**
- **C – Compression provide protection from rolling objects. C/75 means 2500 lbs. of force onto the toe.**
- **EH – Electrical Hazard: designed to protect wearers from up to 600 volts in a dry setting.**

OSHA 29 CFR 1910.136

Footwear



Safety glasses (prescription or otherwise) will meet the requirements of ANSI Z87.1 + as indicated by the Z87.1+ logo stamped on the frame of the glasses. Prescription glasses must have the optical company letters or logo monogramed in the lens to be "safety" approved.

OSHA 29 CFR 1910.133
Eye and Face Protection

OSHA 29 CFR 1910.138
Hand Protection

Other PPE

Goggles
Face shield
FR Clothing
Nitrile gloves
Rubber gloves and apron
Rain gear
Rubber boots
Hearing protection (muffs, plugs)
Noise Reduction Rating - 30

OSHA 29 CFR 1910.95
Occupational Noise Exposure

Respiratory Protection

OSHA 29 CFR 1910.134
Respiratory Protection

Requirements of Respirator Program

YOU must:

- Pass a physical evaluation & be fit tested annually.
- Inspect before each use.
- Have supervisor/designee inspect annually.
- Check fit before each use.
- Cannot have facial hair that interferes with the seal between the respirator and the wearer’s face Clean after each use (Wipes or Wash).
- Replace with same make, model and size that was fit tested.
- Store in a vinyl bag in PPE (or personal) locker

Training and Information

- **Employees are trained so they can demonstrate knowledge of:**
  - why the respirator is necessary and how improper fit, use, or maintenance can compromise its protective effect.
  - limitations and capabilities of the respirator.
  - effective use in emergency situations.
  - how to inspect, put on and remove, use and check the seals.
  - maintenance and storage.
  - recognition of medical signs and symptoms that may limit or prevent effective use.

Training and Information (cont'd)

- Training must be provided prior to respirator use.
- Retraining is required annually, and when:
  - changes in the workplace or type of respirator render previous training obsolete.
  - there are inadequacies in the employee's knowledge or use.
  - any other situation arises in which retraining appears necessary.

Definitions - Employee Exposure

- **Employee exposure** is the concentration of an airborne contaminant that would occur if the employee were **not** using respiratory protection.

- **PEL, TWA and TLV** refer to the concentration of contaminant in air that one can be exposed to continuously over an 8-hour period without having to wear respiratory protection.
  - Permissible Exposure Limit (PEL) is set by OSHA
  - Time Weighted Average (TWA) is set by NIOSH
  - Threshold Limit Value (TLV) is set by ACGIH

- The **Short Term Exposure Limit (STEL)** is the concentration in air of a contaminant that one can be exposed to over a 15-minute period without having to wear respiratory protection.

Types of Respirators - Negative Pressure

- Respirators in which the air pressure inside the face piece is **negative during inhalation** with respect to the ambient air pressure outside the respirator.

- **Air Purifying Respirator** uses an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

- **Dust mask** uses a filter as an integral part of the face piece or with the entire face piece composed of the filtering medium.

Types of Respirators - Positive Pressure

- Respirators in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

  - **Powered air-purifying respirator** (PAPR) uses a blower to force ambient air through air-purifying elements to the inlet covering.

  - **Airline respirator** supplies breathing air from a source independent of the ambient atmosphere (Grade D air)

Fall Protection

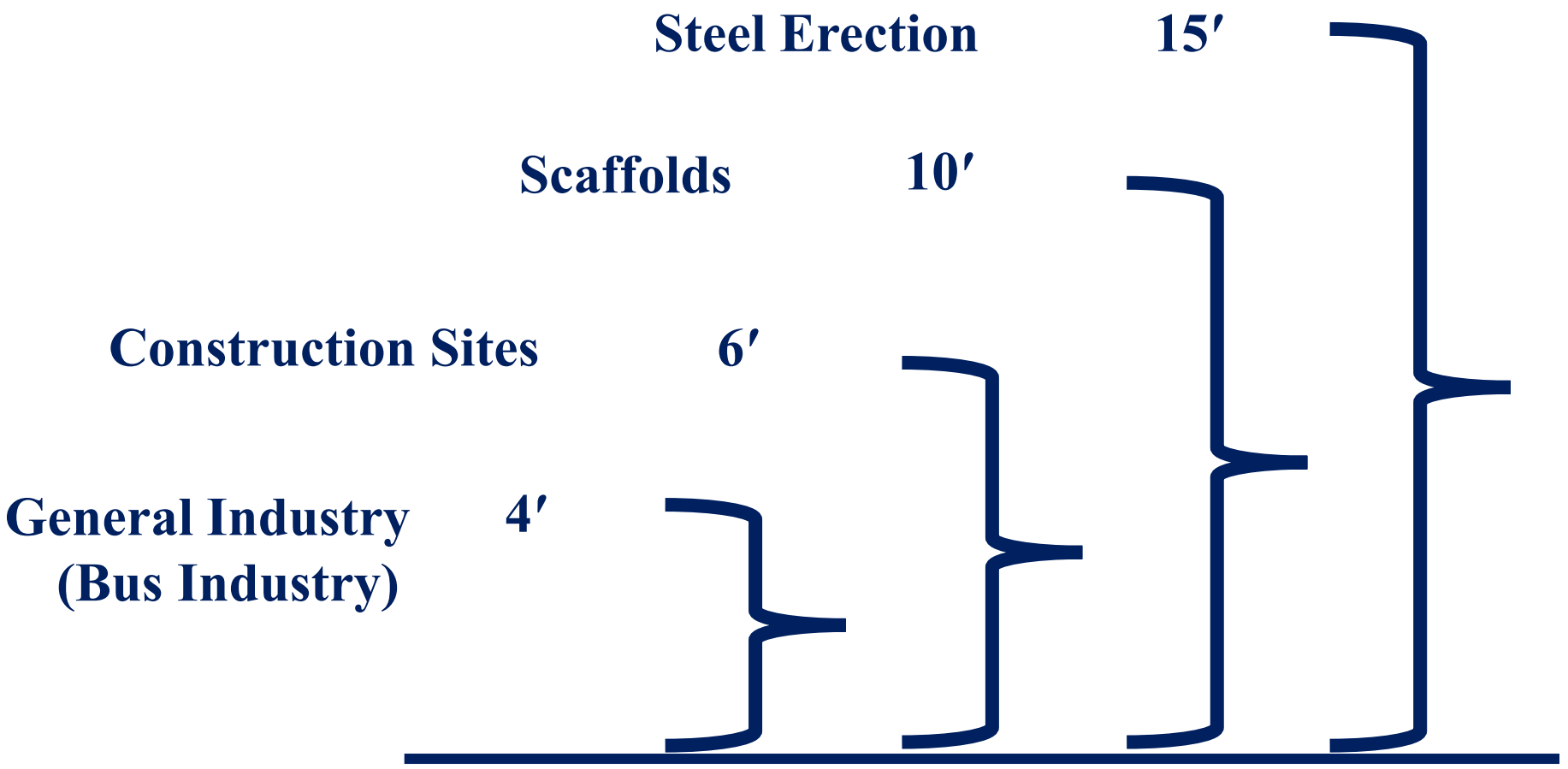
I will not work at heights >**4 feet** without using required fall protection or having been trained in its use.

- **Wear harness with correct lanyards/hardware when fall potential *could* be encountered (100%)**
- **Tie off and use correct lanyards/hardware when fall potential *is* encountered**
- **Inspect all gear, work platforms, scaffolds, ladders, and anchor points**
- **Secure all tools and work materials**
- **Rescue Plan is in place and ready to execute**

OSHA 29 CFR 1910.140
Personal Fall Protection

Fall Protection Requirements

Trigger Heights



GRAVITY works 24/7
GRAVITY does not ask for IQ.
GRAVITY does not ask how good is your balance.
GRAVITY does not consider how long you have been on the job.
GRAVITY does not ask how many years of schooling you have.
GRAVITY does not ask how quickly you can react.

Know the human factors that come into play

Perception versus **Reality** in Fall Protection Training

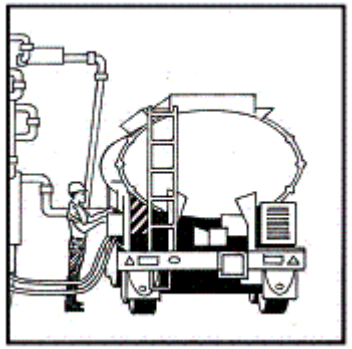
The **Perception** is smarter, more educated, younger people fall less often than those less educated and older.

The **Reality** is well stated above. When scaffolding gives way, it does not ask any of the questions listed.

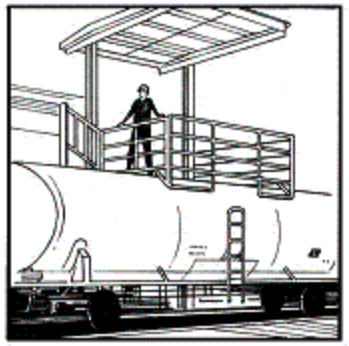
GRAVITY does not discriminate!

Fall Protection Hierarchy

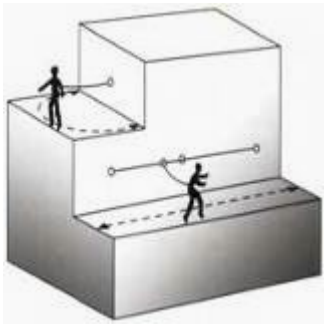
Assessing the Fall Hazard



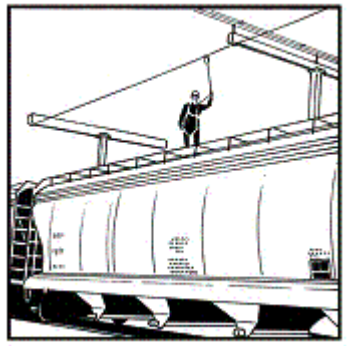
ELIMINATE
Work At Ground Level



PREVENT
Work In Guarded Area



RESTRAIN
Work while Anchored

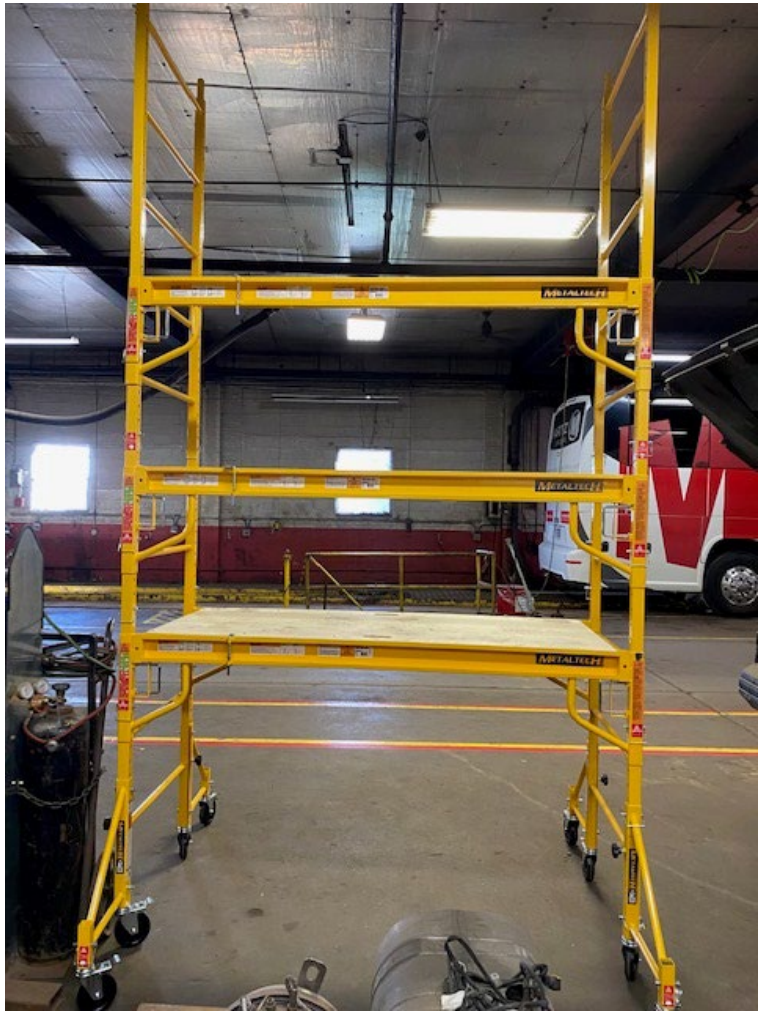


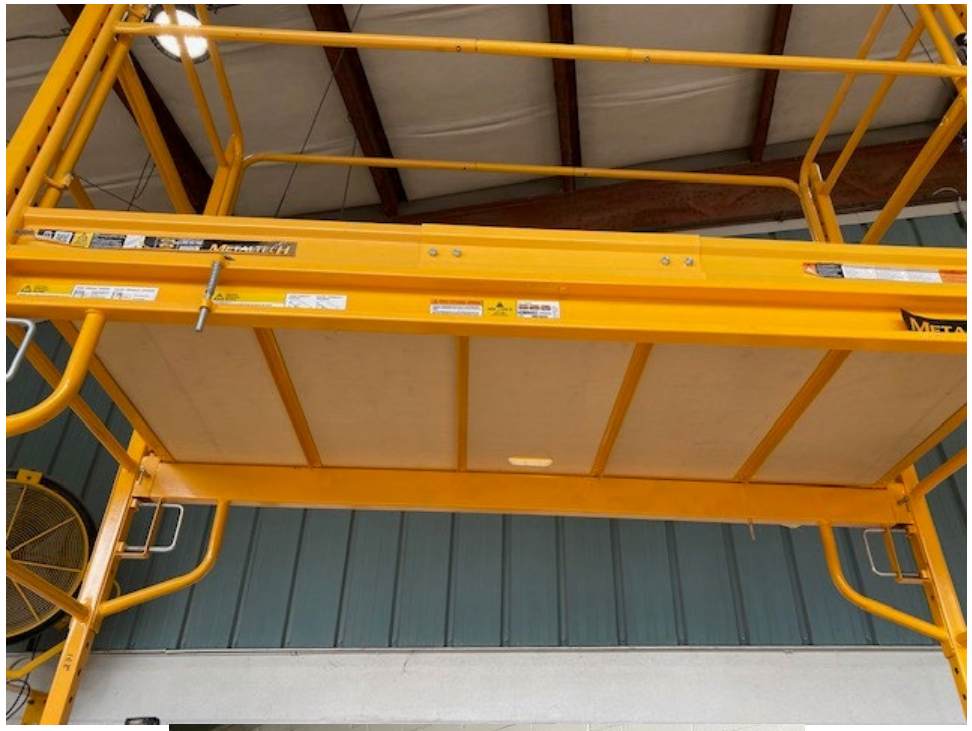
ARREST
Work with an Engineered Fall Arrest System

Inspected prior to each use and annual certification

This is NOT an Anchorage

or a harness, or a lanyard…





OSHA 29 CFR 1910.27
Scaffold & Rope Descent Systems

Working At Heights – Ladder Safety

Ladders must meet OSHA/ANSI requirements.

OSHA 29 CFR 1910.27/ANSI a14 Ladders

A valiant attempt to avoid getting a taller ladder

Working At Heights – Ladder Safety

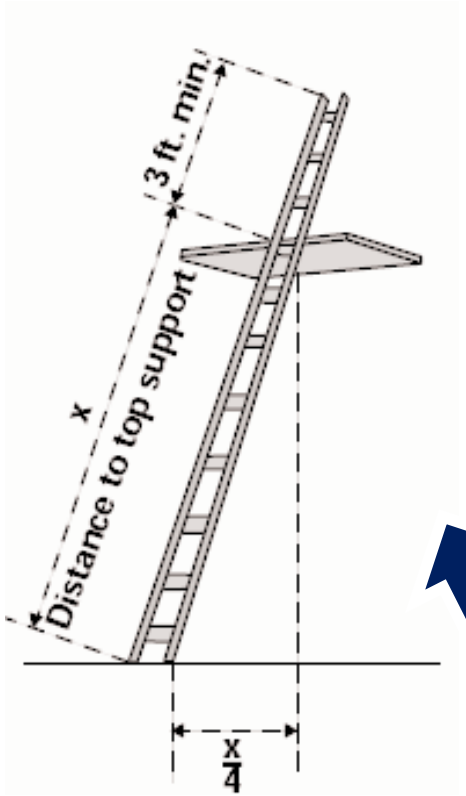
1. Choose the right style of ladder for the job. Weight of user, tools and materials should never exceed rating of the ladder.
2. Ladders must be inspected before each use for loose or damaged rungs, steps, rails, braces or non-slip feet.
3. If damage is found that may affect safety, the ladder must be immediately tagged and removed from service.
4. Wear shoes with non-slip soles.
5. Place all ladder legs on solid, level ground or on stable base
6. While ascending/descending you MUST face the ladder.
7. Do not carry heavy/bulky items; use bucket/rope or tool belt.
8. Do not work on ladders during a severe storm or strong wind.
9. Protect the ladder base from traffic. If a ladder must be placed in front of a door, ensure the door is locked/guarded.

Working At Heights – Ladder Safety

1. Always use "three-points of contact”: two hands and a foot **OR** two feet and a hand.
2. Never use the top step of ladder or step over the top of ladder.
3. Never attempt to "walk", "hop", or "laterally" move a ladder while standing on it. Never overreach! Move it.
4. Tie off the ladder once you have climbed to your working height **OR** have someone hold at the base.

When extension ladders are used to access an upper landing or surface, the ladder rails must extend at **least 36 inches <u>above</u>** the upper landing surface AND must maintain a 4:1 ratio (4 feet up versus 1 foot out) from the base of the ladder to the base of the structure.

Not exactly a 4:1 ratio



Proper placement of ladder

Working at Heights – Personnel Lifts

- **Personnel lift devices**
  - ✓ **Aerial lifts** - Scissor lifts and other personnel lifting devices **require the use** of a fall restraint device or a personal fall limiter (retractable lanyard).
  - ✓ The fall protection device must be tied off regardless of height.
  - ✓ Follow the manufacturer's requirements for anchorage points.
  - ✓ Do not tie off to a building structure, use the anchor point on the lift.

OSHA 29 CFR 1910 Subpart F
Powered Platforms, Manlifts & Vehicle-Mounted Work Platforms

OSHA 29 CFR 1910.66
Building Maintenance

What is Hot Work?

Hot work is any work process that produces flames or sparks that present a fire ignition hazard to the surrounding environment and personnel.

Examples of hot work:

Gas torch welding and cutting uses a flame to join or cut metal.

Arc welding and cutting uses an electric arc between a metal electrode and a base material to join or cut metal.

Grinding uses a grinding wheel that rotates at high speed to cut metal.

Brazing and soldering uses heat to melt a filler metal that is used to join metal.

OSHA 29 CFR 1910.252
Welding, Cutting & Brazing

Hazards Associated with Hot Work

Hot work presents a variety of hazards:

Fire

Intense heat, sparks, or metal splatter produced during hot work can create fire hazards.

Electric shock

If you touch two metal objects containing voltage, you will become a part of the electrical circuit. Higher voltages increase the risk of injury or death.

Arc flash

Arc flash occurs when an electric current leaves its intended path and travels through the air from one conductor to another or to the ground.

Burns

Radiant energy, sparks, or metal splatter can cause serious burns.

Flammable gases

If allowed to accumulate, flammable gases can flash or explode with catastrophic results.

Intense light

The incredibly bright light of arc welding can cause serious eye damage.

Hazard Controls

Based on the hazard assessment, you should establish hazard controls for each risk

Controlling combustible materials:

- Remove all combustible materials **35 feet** from the work area.
- Move combustibles located on the opposite side of partitions and ceilings that will be subject to welding or cutting.
- Avoid unmovable combustible materials, such as wooden floors.

If unable to remove or avoid fire hazards:

- Cover combustible floors or materials with fire blankets or other suitable non-combustible material to contain slag and sparks.
- Use guards.
- Establish restrictions.
- In some cases, hot work may be prohibited entirely.

Additional Fire Prevention Measures

- **Fire watch:** Establish a fire watch in areas where fires might develop. Continue the watch for at least 30 – 60 minutes after completion of hot work.
- **Fire extinguishers:** Provide at least one 10-pound ABC fire extinguisher in each hot work zone.
- **Ducts and conveyer systems:** Shut down ducts and conveyor systems that might carry sparks.
- **Atmosphere control:** Monitor the air, checking for flammable or explosive gases or vapors. If necessary, purge and inert the atmosphere.
- **Safe disposal:** Provide metal buckets or containers for safe disposal of hot work debris.

Other Hazards

- **Welding arc rays:** Position welding curtains to protect employees from intense light. Provide the proper shade of lens.
- **Electrical shock:** Keep working conditions dry and provide proper PPE.
- **Arc flash:** Provide high-resistance grounding and proper PPE.
- **Burns:** Install guards and provide proper PPE.
- **Fumes and other toxic byproducts:** Properly ventilate work areas and provide adequate respirators.
- **Toxic coatings:** When possible, strip toxic coatings from metal before beginning hot work.

A welding curtain shields employees from the direct rays of arc welding and cutting operations.

A welder uses a local exhaust duct to quickly remove toxic fumes and gases.

Common PPE

To protect against **burns,** cover all exposed flesh.

PPE that protects against **electric shock** includes insulated gloves and rubber-soled shoes.

Buttonable collar

Welding hood
with adjustable lens filter

Fire resistant gloves

Fire resistant jacket
hanging outside of pants without open pockets

Fire resistant trousers
without cuffs on pant legs

Leather high-top boots with steel/composite toes

OSHA 29 CFR 1910.157
Fire Extinguishers

OSHA 29 CFR 1910.159
Automatic Sprinkler Systems


OXYGEN
O_2
IGNITION
CHEMICAL REACTION
FIRE PYRAMID


A


B


C


K
U
Na
D
Mg
Al
METALS

Fire Extinguisher Identification

- All ratings are shown on the extinguisher faceplate.
- Some extinguishers marked with multiple ratings.
  Capable of putting out more than one class of fire
  (e.g., AB, BC, ABC)

- All fire extinguishers are required to include directions.
  Take a moment to read them, first!


PULL
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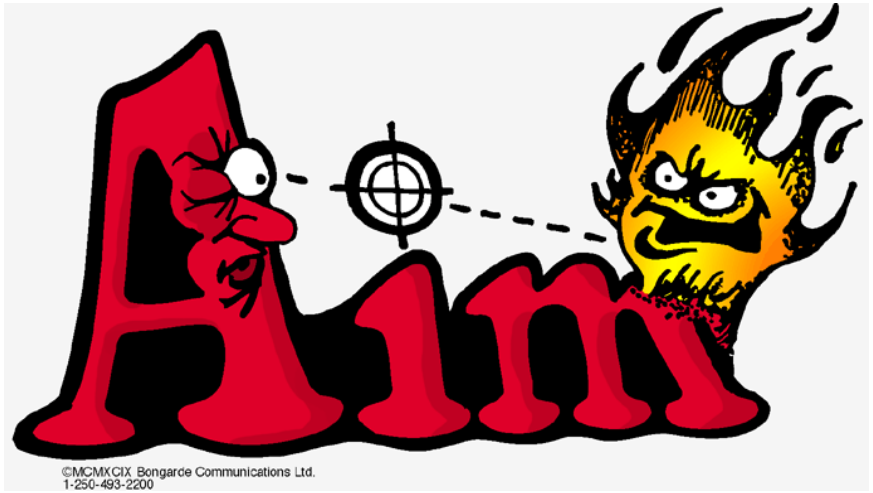
1-250-493-2200


AIM
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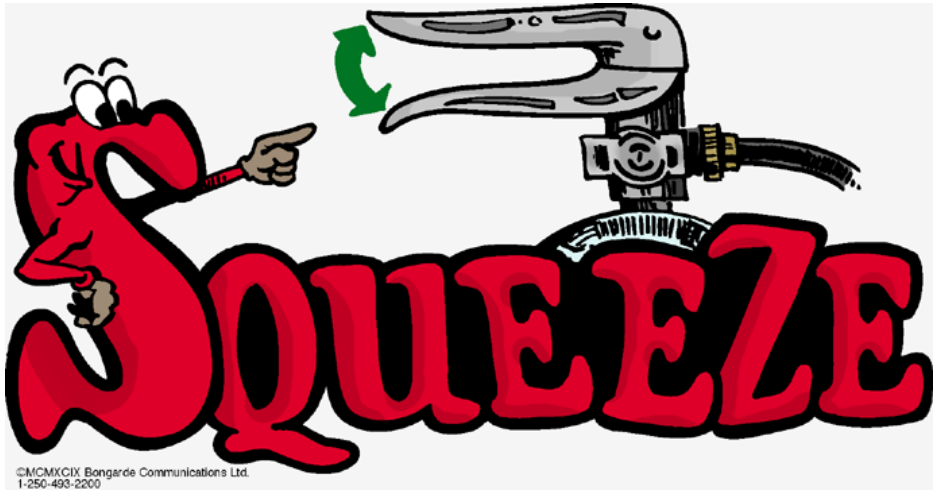
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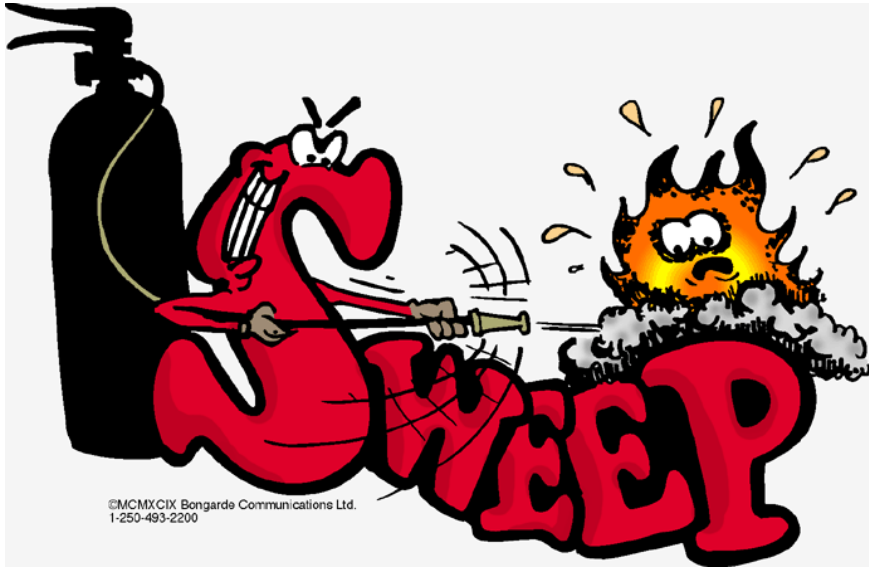
SWEEP
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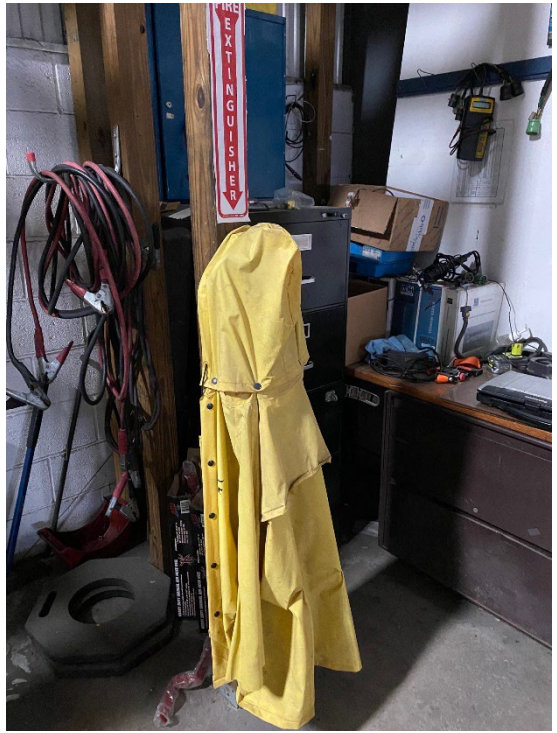
Quick Inspection

- Know the location of the fire extinguisher
- Check the classification
- Check the seal for tampering or use
- Ensure pin, nozzle and nameplate are intact

Fire Extinguishers

- Portable fire extinguishers must be mounted, identified, and readily **accessible**
- Portable fire extinguishers must be visually inspected monthly, and inspection must be documented
- Portable fire extinguishers must undergo an annual certification



Questions

Questions

Questions

Questions