

Hoistway Safety

INTRODUCTION:

Hoistway maintenance is performed mostly from the car top, but we also maintain the pit and machine spaces. These silent, confined areas can be the most unfriendly and dangerous in the performance of your daily tasks. Equipment is always moving around you. In multiple car installations, hazards exist inches outside of the car top or pit perimeter.

Each installation presents different hazards. To become familiar with each installation and identify new hazards before beginning maintenance or repair operations, perform a JHA/JSA.

Variations in equipment in the modern elevator hoistway create endless topics of discussion.

OBJECTIVES:

By the end of this lesson, you will be able to:

1. Identify hoistway, pit, and machine space hazards
2. Identify hoistway, pit, and machine space hazards specific to Machine Room Less conveyances
3. Identify best practices for eliminating/controlling hoistway, pit, and machine space hazards
4. Describe best practices for safe access/egress of pits, car tops, and machine spaces.

What are some of the common hoistway, pit, and machine space hazards we encounter?

Machine Room/Machine Space

- Rotating Equipment
- Electrical Hazards

Cartop/Hoistway:

- Rotating/Moving equipment
- Moving equipment in adjacent hoistways
- Falls
- Tripping Hazards
- Electrical Hazards



What are some of the common hoistway, pit, and machine space hazards we encounter cont.?

Traction Pit:

- Caught-In and Struck-By
- Access/Egress
- Rotating/moving machinery
- Moving equipment in adjacent hoistway
- Walk-in pit/crossing into adjacent pit
- Stored energy
- Tripping hazards

Hydraulic Pit:

- Caught-In and Struck-By
- Access/Egress
- Moving machinery in adjacent hoistway
- Stored energy
- Tripping hazards



Safety Procedures

Now that we have identified some of the hazards you may encounter, let's talk about some industry best practices to address them.

The practices that we will discuss are used throughout our industry. Your employer may have a different process than those discussed here. Always follow your company's established safety policy.

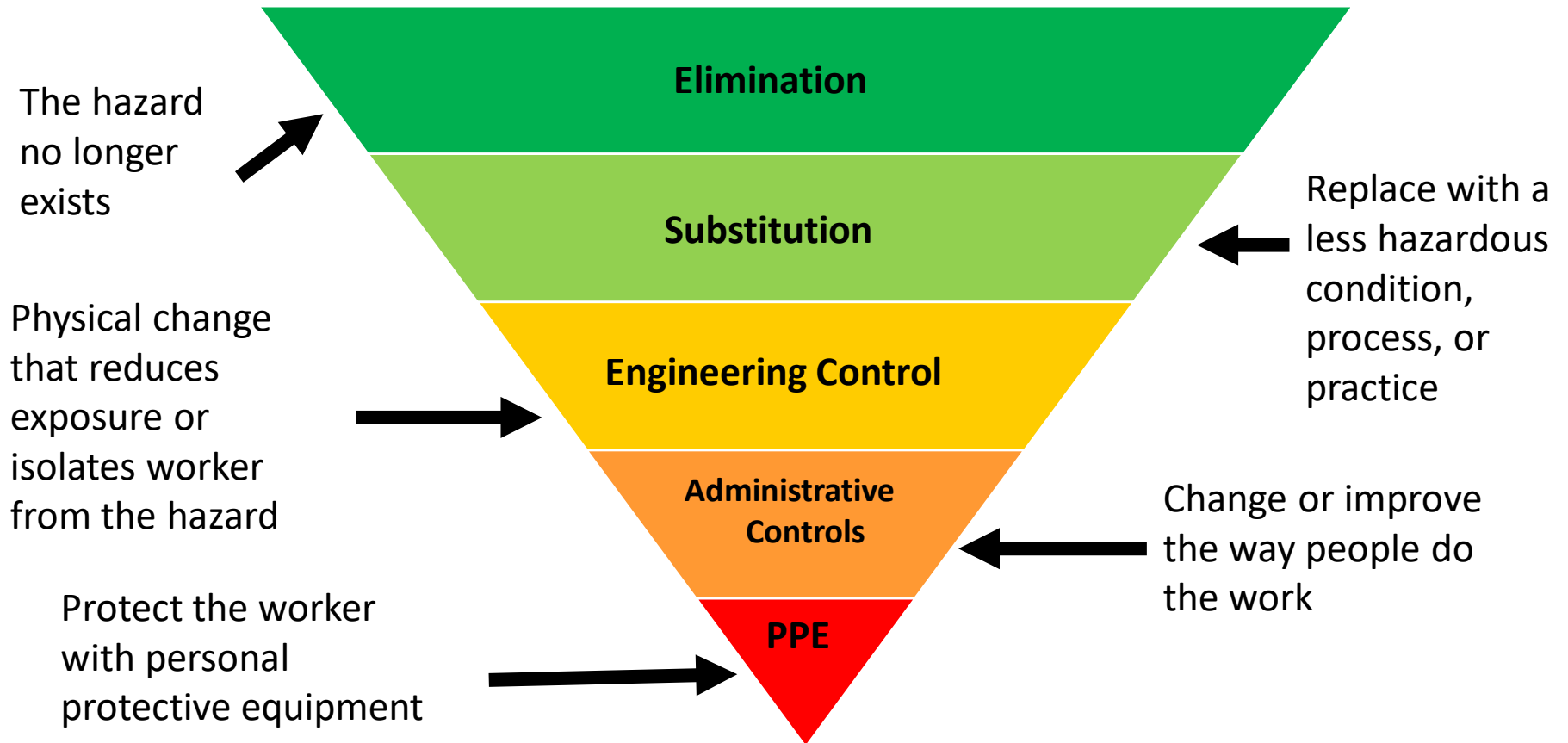
Safety Procedures

The hierarchy of hazard controls describes the order in which different injury and illness prevention methods should be used. The most effective methods are at the top, while the least effective are at the bottom.

There are five levels of controls:

- Elimination
- Substitution
- Engineering controls
- Administrative controls
- Personal protective equipment (PPE)

Hierarchy of Hazard Controls



Fall Protection

At some point, you will be exposed to a fall hazard while working in the hoistway. OSHA 1910.28 says workers must be protected from falling when working 4' or more above a lower level or when working less than 4' above dangerous equipment that is unguarded. There are a few different ways to address a fall hazard:

- Guardrail system
- Fall Restraint System
- Personal Fall Arrest System



Fall Protection

Guardrail systems must meet the requirements of OSHA 1910.29:

- 42” top rail (+- 3”)
- 21” mid rail

Top rails must be capable of withstanding a force of 200 lbs. and mid-rails a force of 150 lbs, applied in any outward or downward direction.

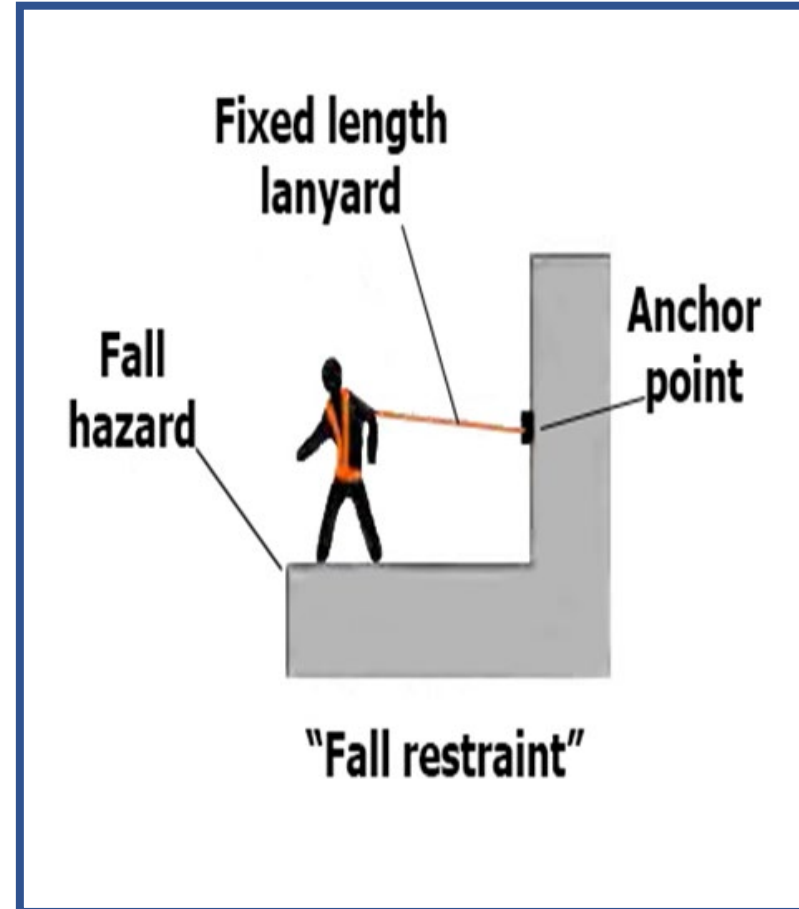


Fall Protection

Fall Restraint System means a fall protection system that prevents the user from falling any distance.

- Uses a body belt or body harness
- A fixed length or adjustable lanyard
- An anchorage

Fall restraint systems prevent the worker from getting close enough to the fall hazard to fall off the edge.

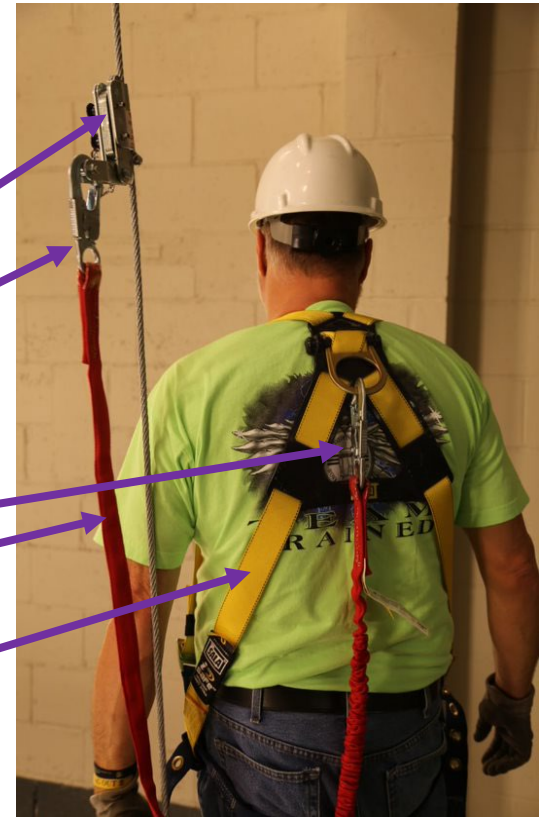
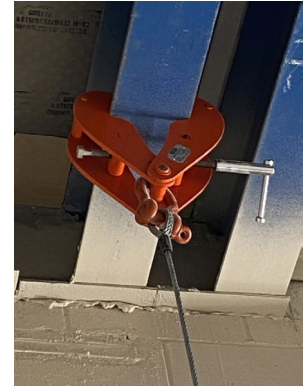


Fall Protection

Fall Arrest: Personal Fall Arrest Systems are designed to catch workers after they have fallen.

The components of a PFAS are:

- Anchorage
- Lifeline/Rope grab
- Connectors
- Lanyard
- Body Harness



Multiple Car Hoistways

Caught In/Between and Struck-By Hazards

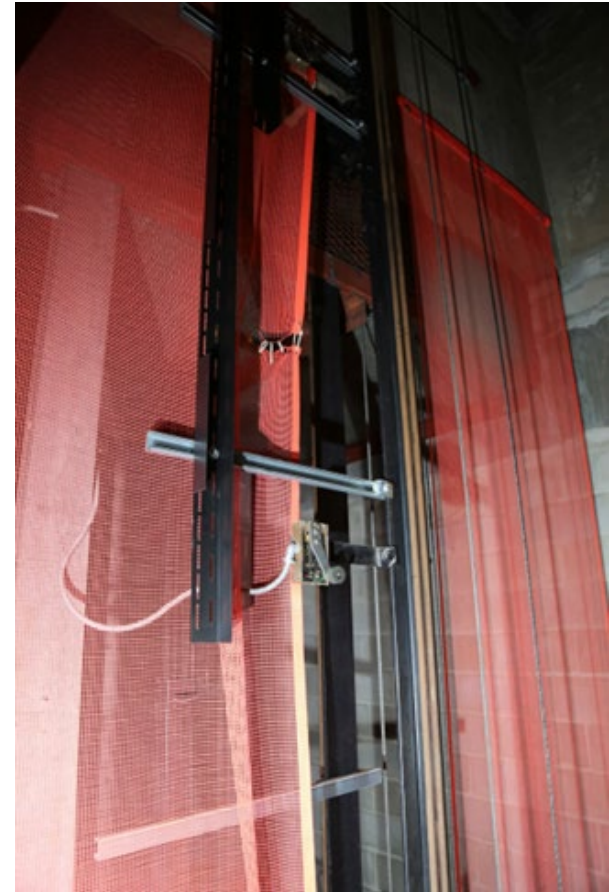
When working from a cartop in a multi-car hoistway, precautions must be taken to protect workers from caught in/between and struck-by hazards related to the adjacent equipment.



Multiple Car Hoistways

Caught In/Between and Struck-By Hazards

Some options would be removing the adjacent elevator from service, installing hoistway screening between the cars, or screening/barricading the car top work area.



Machine Room and Machine Space Hazards

Machine rooms and machine spaces are required to have a safe means of access. This may be through a door, a hatch, from the car top, or in the pit.



Machine Room and Machine Space Hazards

The ability to recognize potential hazards and know how to correct them is important.

Regardless of which type of machine room or machine space you have, there are some common hazards associated with them all.



Machine Room and Machine Space Hazards

Just getting to the machine room or machine space can be dangerous. Some of the common hazards we encounter are:

- **Lighting:** Dimly lit hallways and stairwells can be hazardous. Have building maintenance correct any lighting issues. Don't try to navigate in the dark.
- **Ladders:** Some machine rooms can only be accessed from a fixed ladder. Always inspect the ladder for defects before use and never climb the ladder with tools or equipment in your hands. Use a rope to pull tools up to the machine room.
- **Rotating equipment:** Most machine rooms and machine spaces will have rotating equipment. Erect barriers to prevent accidental contact.
- **Electrical:** Conveyance controllers contain high voltage equipment. Always LOTO when power isn't needed and wear the proper PPE for the task.

Traditional Machine Room

Traditional machine rooms are located above, or adjacent to the elevator hoistway. Access is usually through a standard walk-through door.

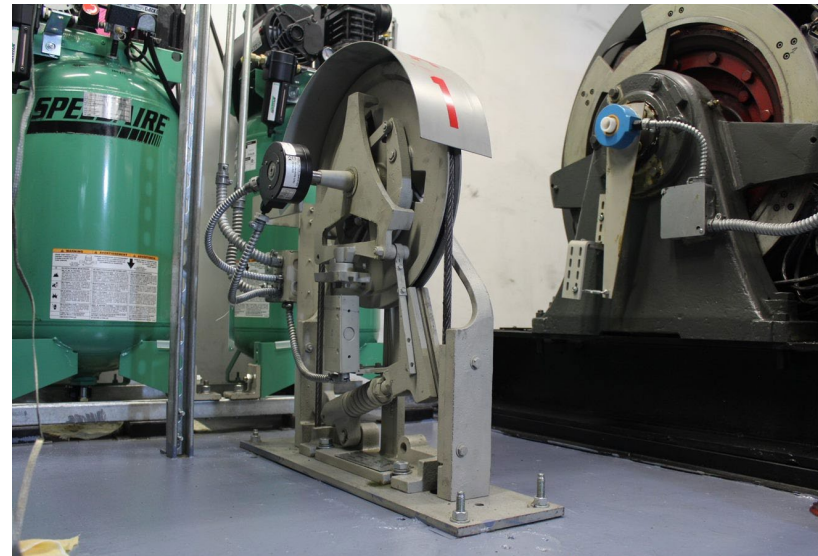


Traditional Machine Room

Electricity and rotating equipment are common hazards.

Lockout/tagout when working in the controller and power isn't needed. If power is needed, follow your company's live electrical work process and wear the proper PPE.

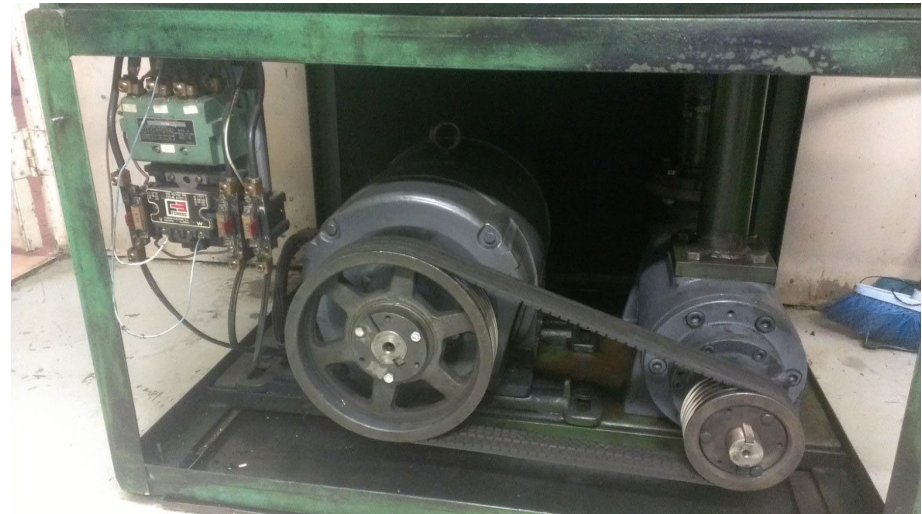
Keep guards in place on rotating equipment and erect barriers when necessary to prevent unintentionally being caught in the equipment.



Traditional Machine Room

Hydraulic machine rooms contain the oil tank, pump motor, and valve. The oil in the system can become very hot and equipment can start without any warning.

Always lockout/tagout before removing guards or the tank cover. This will prevent your fingers and hands from being caught in the V belts or being splashed by hot oil.



Machine Room Less (MRL) Installations

Just as with control systems, every company has their own version of an MRL (machine room-less elevator). Mounting procedures for the machine will vary from rail mount systems to systems that place the machine in the overhead. Some manufacturers put the hydraulic machines in the pit.

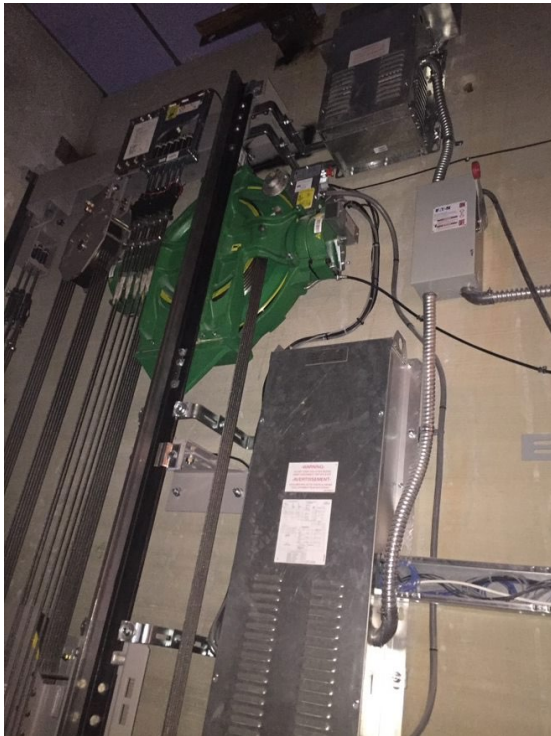
Regardless of how the MRL equipment is installed, it's location inside the hoistway, combined with access to the equipment from the cartop, present some unique safety hazards that you should be aware of.

Machine Room Less (MRL) Installations

The controller

The power controller for an MRL installation will usually be located somewhere in the hoistway. It can be mounted to a side wall or located on a front wall with the door and frame equipment.

There may also be a smaller sub-controller mounted outside the hoistway in the door frame.



Machine Room Less (MRL) Installations

The controller cont.

If you open the controller located in the frame or hallway, make sure you wear the proper PPE and put up a barricade to keep people from entering your workspace. People are naturally curious and there are high voltages in that panel.

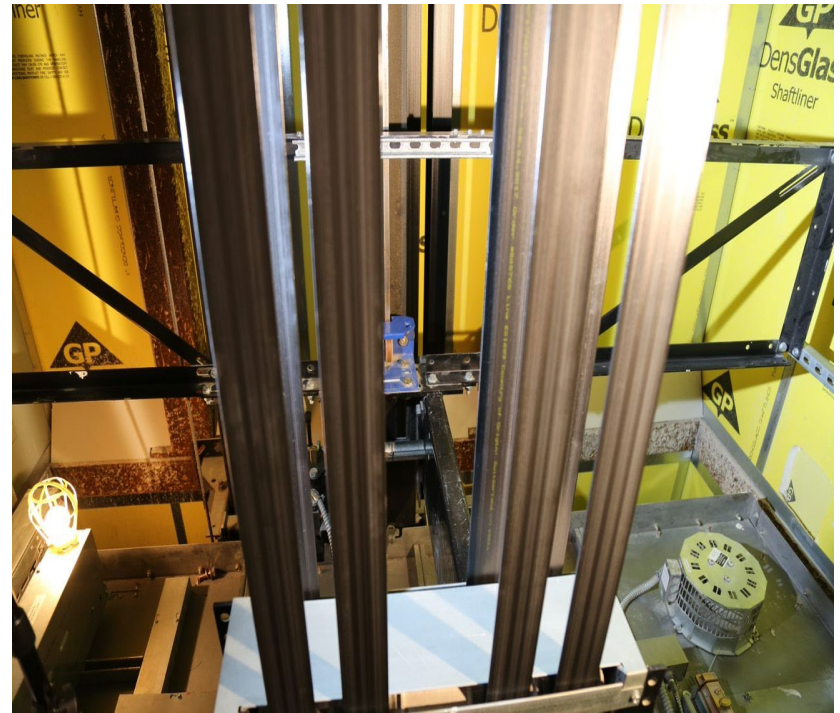


Machine Room Less (MRL) Installations

The controller cont.

When you work on a MRL controller, be aware of your position on the car top. Ensure that you have good, stable footing and always lockout/tagout when power isn't needed. The area can be crowded with equipment. If live electrical work is required, wear the proper PPE and follow your company's live electrical work policy.

If the cartop is not equipped with guardrails and you are exposed to a fall hazard, a Personal Fall Arrest System or Positioning System will need to be used.



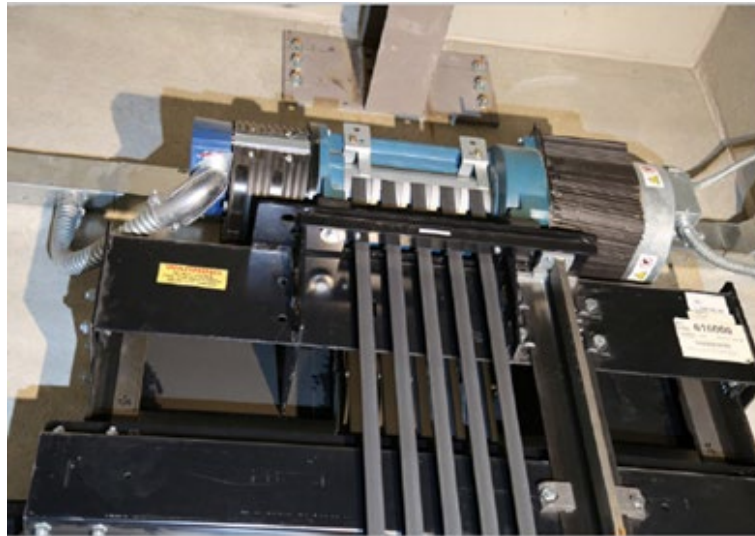
Machine Room Less (MRL) Installations

The machine

The traction MRL machine may be mounted on the rails or at the top of the hoistway. Be aware of pinch points.

If mounted above the hoistway, be aware that there may be a low overhead condition. Use caution when running the car up on inspection.

If mounted on the rails, there may be a fall hazard present on that side of the cartop.



Machine Room Less (MRL) Installations

A hydraulic MRL will have the pump and tank located in the pit. It may be off to one side or directly under the car. This reduces your refuse space in the event of an emergency. NEVER position yourself between the car and the tank unit and ALWAYS identify your refuse space before entering the pit. If you are going to perform any work over or in the tank, or any work on the hydraulic system, stored energy must be eliminated.



Accessing the car top:

Stay within the perimeter of the car top. Clearances to other equipment or even another car or counterweight can be less than an inch to the car top you are standing on.

Hoistway screening can be installed Between cars to minimize these hazards.

Avoid loose fitting clothing and items worn on your belt, they can easily be snagged and pull you off the car top, even at inspection speeds.



If notified by the building owner, or if it's posted that the hoistway has been classified as a permit required confined space, STOP! Notify your Supervisor and follow your company's PRCs policy.

Accessing the car top cont:

Lockout/Tagout procedures should be followed if movement of the elevator is not needed to complete the work.

Before stepping onto the car top, activate STOP switch to “STOP”, locate a safe refuge area on the car top. Be aware of any fall hazards.



Accessing the Pit:

Conveyance pits are dangerous. Be aware of the hazards before entering a pit and take appropriate steps to address those hazards.

Some of the more common hazards are:

- Access/Egress
- Moving/rotating equipment
- Inadequate lighting
- Tripping hazards
- Unsafe pit ladders



Accessing the Pit cont:

Some less common hazards are:

- Environmental (heat, cold, water)
- Atmospheric hazards
- Biohazards

These types of hazards will require specific practices and PPE to keep you safe.



If notified by the building owner, or if it's posted that the pit has been classified as a permit required confined space, STOP! Notify your Supervisor and follow your company's PRCS policy.

Accessing the Pit cont.:

Lockout/Tagout procedures should be followed if movement of the elevator is not needed to complete the work. Install barricades if the hoistway door is going to be open while performing your work.

Turn the pit light on and place the pit stop switch in the “STOP” position. Test and verify that the stop switch is working properly.



Accessing the Pit cont.:

In deeper pits, a second stop switch is usually installed about 4 feet above the pit floor.

After descending the pit ladder, place the lower pit stop switch in the “STOP” position.

The second stop switch must also be tested and verified. Follow the same procedure as the primary stop switch.



Walk-In Pit:

Every walk-in pit is different so it would be impossible to make one set of rules that applies to all situations.

Access/egress procedures must be established for each building based on site specific conditions.

ASME A17.1-2019 Code for Elevators and Escalators establishes safety code requirements for walk in pits. We will review those requirements and talk about some additional safety procedures for walk in pits.

Walk-In Pit cont.

Pit access/egress will be through the lowest hoistway door or through a separate pit access door. If access/egress is through a separate door, there are some requirements that must be met.

- If the door swings into the pit, it can't interfere with moving equipment.
- If the door swings out, structural and mechanical parts of the car can't project below the top of the access door frame (except for car guide shoes or rollers, and safety jaw assemblies).
- If parts of the car do extend below the access door frame, an electrical contact must be provided on the access door to prevent operation of the elevator when the door is open, and the door must have a vision panel.
- Walk-in pit access doors must be at least 29.5 inches wide, and 72 inches high and be self closing and locking.

Walk-In Pit cont.

Walk-in pits require a stop switch to be accessible from the pit access door. Where access to the pits of elevators in a multiple car hoistway is by means of a single access door, the stop switch for each elevator must be located adjacent to the nearest point of access to its pit from the access door.

Counterweights must be guarded to a height of at least 96 inches above the pit floor. In multiple car hoistways, the counterweight must also be guarded on the side next to the adjacent elevator.

There may be sheaves and other equipment in the pit that you could get caught in. Governor sheaves, compensating rope sheaves, compensating chains, etc. Be sure all guards are in place and put-up temporary barricades if necessary.

Be aware of your surroundings at all times.

Walk-In Pit cont.

Whichever type of pit you are working in, there are some general safety considerations that you should remember:

- Always have at least two separate circuits tested and verified to prevent unintended movement of the conveyance and to ensure that you have control.
- Never work in a pit without adequate lighting.
- When you enter the pit, locate a safe refuge area. This area will sometimes be designated and marked on the floor.
- Be aware of moving or rotating equipment and ensure that guards are in place.
- Never stand on hydraulic piping. It is not designed to support your weight. If work must be done on the hydraulic system, land the car on pipe supports, not wooden timbers.
- Never work in a pit with standing water and always use a GFCI for power tools and portable lights.

Summary

We identified some of the hazards you will encounter while performing your work in the hoistway and pit and discussed some industry best practices to address them.

The practices that we discussed are used throughout our industry. Your employer may have a different process than those discussed here. Always follow your company's established safety policy.

The hierarchy of hazard controls described the order in which different injury and illness prevention methods should be used. It is always best to eliminate the hazard if possible, and PPE should be your last line of protection if the hazard could not be controlled in any other manner.

Check Your Knowledge

True or false:

The top rail of a guardrail system can be 44" in height?

True: 42" plus or minus 3".

Check Your Knowledge

A fall hazard can be addressed by which of the following?

- a. Guardrail system
 - b. Fall Restraint System
 - c. Personal Fall Arrest System
 - d. All of the above
-
- d. All of the above

Check Your Knowledge

In a walk-in pit, if parts of the car extend below the access door frame, What would be required on the door?

- a. An electrical contact to prevent operation of the elevator when the door is open.
- b. An audible alarm when the door is open.
- c. A warning light outside the door.

a. An electrical contact to prevent operation of the elevator when the door is open.

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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ANY
QUESTIONS?

