

Introduction to the Hierarchy of Controls

The hierarchy of controls is a step-by-step approach to control workplace hazards using the most effective controls possible. It is represented as an inverted triangle with five levels of hazard controls, ranked from most effective to least effective. According to the National Institute for Occupational Safety and Health (NIOSH), “use of the hierarchy can lower worker exposures and reduce risk of illness or injury.”

This one pager explains each level of the hierarchy and provides examples you could implement at your organization, as well as tips on choosing hazard controls.

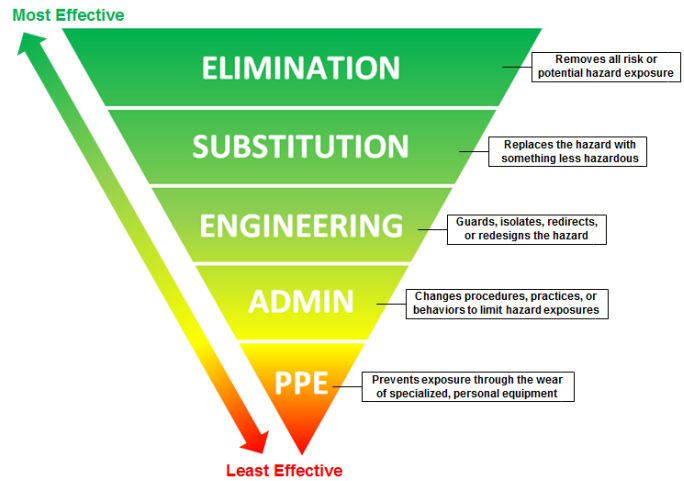


Image created by the DoD SMCX

ELIMINATION

Elimination removes hazards, risks, or potential exposures, **and is the best control**. It often requires major changes when implementing it into existing processes, equipment, and procedures. Examples of elimination include:

- Change the water treatment process by adding a chemical auto-feed to remove a chemical exposure
- Remove flammable storage cabinets from hot work areas to eliminate fire hazards
- Purchase pre-cut, ready-to-use wood to eliminate a woodcutting process and its manufacturing and cutting hazards
- Relocate machinery to a lower level to eliminate a fall hazard.



Image retrieved from [Bing Images](#)
The image shows an enclosed booth, eliminating the need for hearing protection during this process.

SUBSTITUTION

Substitution replaces a hazard with a less hazardous one. It is less effective than elimination because there may be remaining risks requiring additional controls. Sometimes substitution removes a hazard entirely, also making it a form of elimination. Examples of substitution include:

- Replace methylene chloride-based paint stripper with a non-methylene chloride stripper
- Change solvent-based paints with water-based alternatives
- Use lead-free solder if the process allows
- Use electric powered industrial trucks rather than gasoline or diesel ones to eliminate exhaust gases and particulates
- Purchase new, quieter tools to reduce noise levels, requiring single hearing protection rather than double hearing protection.



Image retrieved from Creative Commons
The image shows an electric powered industrial truck in use rather than a gasoline or diesel vehicle emitting exhaust gases and particulates.

ENGINEERING CONTROLS

Engineering controls “engineer out the hazard” by designing a control to reduce the hazard or employee’s exposure – it minimizes a hazard and its risks as much as possible without actual eliminating it. Examples of engineering controls include:

- Enclose a process to prevent employee exposure to noise
- Automate process controls with robotics to change the way a process is done, minimizing worker exposure
- Use a mechanical lifting device to reduce manual lifting tasks
- Install guardrails on a rooftop to prevent falls
- Use local exhaust ventilation to remove air contaminants before reaching an employee’s breathing zone.

ADMINISTRATIVE CONTROLS

Administrative controls are processes, procedures, or work practices used to reduce exposure to hazards. These controls are often implemented with other methods. Examples of administrative controls include:

- Develop safe work procedures for confined space entry
- Use job rotation to limit exposure to heat
- Implement a written equipment preventive maintenance program
- Post signage indicating “Caution: Slippery Surface”
- Train authorized personnel on conducting lockout/tagout activities.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE is anything employees wear to protect them from a hazard. It is the last line of defense and should only be used when other methods are not sufficient to eliminate or reduce a hazard. Examples of PPE include:

- Wear an air-purifying respirator to reduce exposure to airborne dust
- Use cut-resistant gloves to protect against lacerations when opening cardboard boxes
- Wear safety glasses and a face shield to protect against projectiles when using woodworking equipment.

For additional information on the SMCX’s services, please visit the SMCX-hosted website at: <https://www.smscx.org/>.



Image retrieved from Creative Commons
The image shows a machine guard covering the rotating parts of the pulley to reduce employee contact and exposure.

CHOOSING AND IMPLEMENTING HAZARD CONTROLS

- ❖ Start at the top of the inverted hierarchy and work your way down to choose the most suitable controls
- ❖ Focus on elimination, substitution, and engineering controls during the design phase of processes, the most cost-effective time and approach
- ❖ Choose controls [feasible](#) for your organization
- ❖ Conduct a [PPE hazard assessment](#) to select PPE
- ❖ Use interim controls when it will take time to implement more permanent hazard controls
- ❖ Train employees on the hazard controls implemented
- ❖ Evaluate implemented control effectiveness and determine if a need for additional modification remains
- ❖ Continue to identify, select, implement, and evaluate controls when implemented controls are ineffective
- ❖ Check out additional guidance from the Occupational Safety and Health Administration (OSHA) at: <https://www.osha.gov/safety-management/hazard-prevention#ai4>