# Fall Protection for Mobile Elevating Work Platform Operators and Passengers

## Alberta OH&S Compliant

# Fall Protection for Mobile Elevating Work Platform Operators and Passengers

# Certification

# Alberta OH&S Compliant

## First Edition

**January 8, 2020**



Saga Universal Training Corp. is dedicated to reducing deaths caused by illness and injury. The goal of this program is to ensure operators have the basic knowledge and skills required for the safe operation of their equipment and its attachments. However, due to the different types of equipment, certain statements in this program may not apply.

Job and/or familiarization of operators for particular machines or specialized equipment used in specific workplace environments are in addition to this training. It is expected that an employer will take the fundamentals of this training and apply them to their specific machine and workplace.

Readers should not assume that reviewing this manual alone constitutes complete Mobile Elevating Work Platform operator training.

For further information contact:

***Saga Universal Training Corporation***

***E: mail – info@sagatraining.ca***

***Web Page – www.sagatraining.ca***

Saga Universal Training Corp. wishes to acknowledge the efforts of all the people who contributed to the writing, editing, and layout of this manual. It is our hope that this manual and the resulting training program will aide in the reduction of preventable injuries and property damage with the necessary knowledge, skills and confidence to operate Mobile Elevating Work Platforms safely.

# Table of Contents

## DISCLAIMER

- Information on fall protection in this course is limited to working from an MEWP and is inadequate for any other application.

The information contained in this manual is intended to supplement the specific information that is contained in the Mobile Elevating Work Platform (MEWP) manufacturers' operating manual(s) and manufacturer's instructions for fall protection equipment.

It is expected that an employer will take the fundamentals of this training and apply them to their specific machine and workplace.

Job and/or familiarization of operators for particular machines or specialized equipment used in specific workplace environments are in addition to this training.

Although every effort is made to ensure the accuracy, currency and completeness of the information, Saga does not guarantee, warrant, represent or undertake that the information provided is correct, accurate or current. Saga is not liable for any loss, claim, or demand arising directly or indirectly from any use or reliance upon the information.

## INTRODUCTION

- This course follows the guidelines and standards referenced in the Alberta Occupational Health and Safety Act, Regulations and Code.

The course pays particular attention to the principles established by the Canadian Standards Association (CAN3- B354.4 & B354.2), American National Standards Institute (ANSI A92.5-2006 & A92.6-1999), Occupational Safety and Health Administration (CFR1926.453) and recommendations by the Canadian Centre for Occupational Health and Safety (CCOHS).

- The course provides the minimum requirements for fall protection training of MEWP operators and passengers.

- Due to the different design of equipment classified as Mobile Elevating Work Platforms, certain statements in this program may not apply.

- The course is intended to supplement a company's larger Health & Safety Management System.

Recommended pre-requisites:

- Risk hazard assessment training.
- Basic use of fire extinguisher training.
- Awareness of company specific safety policies, procedures and emergency response plans.
- Familiarity with operator manual for specific elevating work platform to be used on the job.

Certification:

- At the end of each chapter there will be a multiple choice, open-book exam of which, at least 80% correct must be achieved.
- Certificates of training issued by Saga Universal Training Corp. must be recognized by the employer and are valid for 3 years from the date of completion.

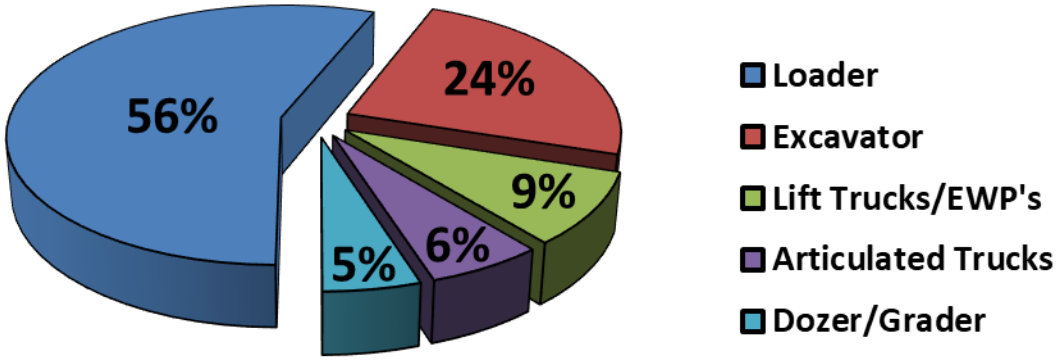
Course Goals:

- The student should understand the relationship between Legislation, Regulations, Standards, Due Diligence, and Best Practices.
- The student should understand the roles and responsibilities of employers and employees and workplace programs as they relate to the operation of Mobile Elevating Work Platforms (MEWP).
- The student should have a basic understanding of fall protection for MEWP.

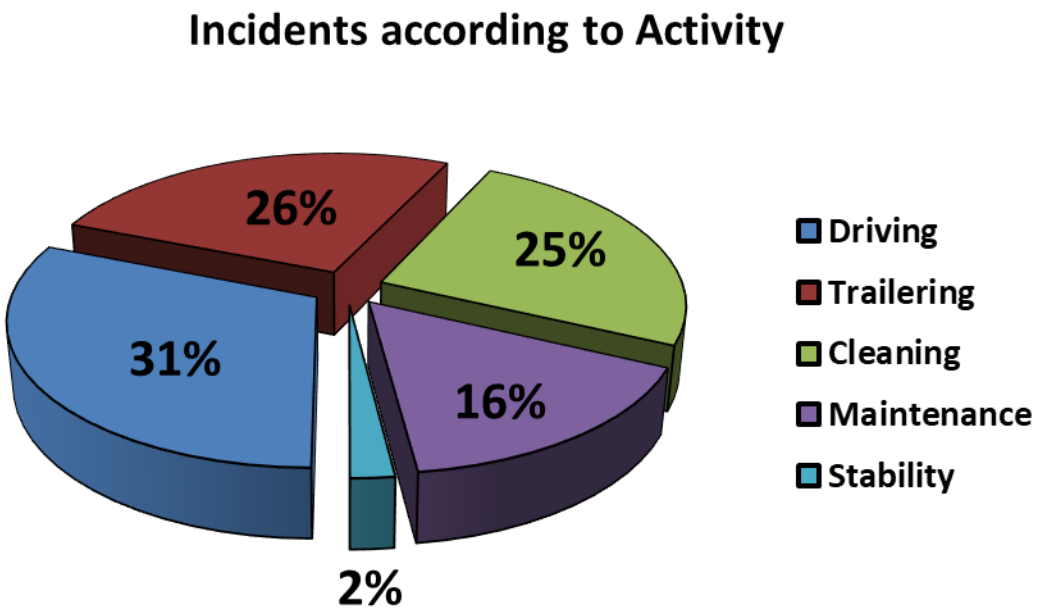
Exposure to Harm

- Of the millions of workers in Alberta, one worker is exposed to a harm causing injury or illness on average, every 3 minutes.
- Most are new workers within their first year of work.
- Of all the workers in Alberta who have been exposed to harm causing injury or illness, one worker will die from that exposure on average, every second day.
- Most will succumb later in life due to an exposure that occurred earlier in their life.

## Incidents according to Equipment




- Of all the workers dying from a workplace exposure, the majority were workers attempting to rescue others.
- Many of them did not have the proper training, equipment, or support to perform the rescue, but felt a moral obligation.
- If a worker is not trained to perform rescue, the worker should be trained not to attempt.
- Operating powered mobile equipment can be one of the most dangerous jobs a worker can have.




Univ.-Prof. Dr.-Inghabil. H. Tudeshki
- DiplIng. M. Könnecke

Recent Fatalities

In 2005/06 falls from height accounted for 46 fatal accidents at work and around 3350 major injuries. They remain the single largest cause of workplace deaths and one of the main causes of major injury.

**UK HSE 2005**

Every year, many workers are injured by vehicles and mobile equipment while working in the same area at the same time.

Around 400 workers are killed on the job each year when they are struck by vehicles or mobile equipment. These workers leave behind countless family members. The tragedy here is that these deaths can be prevented. Workers have been killed when struck by vehicles whose drivers did not see them. In many of these cases, the workers killed were standing, walking, or working around vehicles that were backing up.

*-New York FACE Program New York State Department of Health*

Fatal incidents occurred as a result of:

- MEWP collapsing.
- MEWP overturning.
- People being thrown from the carrier.
- The carrier being trapped against fixed structures (the carrier is commonly referred to as the basket or cage).

Primary causes identified:

- Equipment failure.
- Ground conditions.
- Outriggers (not used or faulty).
- Trapping against fixed structure.
- MEWP being struck by vehicle.
- Load/unload of MEWP under power.

Approximately 250 WCB claims per year (BC OH&S) involving MEWP.

After reviewing and analyzing elevated, mobile elevating work platform incidents in construction during the mid ‘90s, the OSHA Standards Committee deemed it important to include scissor lifts and aerial lifts in the latest (1998) revision of the construction scaffold standard (1926.450). Their investigations revealed that many of contributing unsafe acts and conditions that led up to these particular construction fatalities (1993-1999) were identical in many respects to those of supported scaffold accidents.

The 10 major hazardous activities in elevating work platforms included:

- Operating on an uneven surface.
- Encountering holes, debris and drop-offs while operating with equipment elevated.
- Climbing above or leaning over the 42-inch minimum top rail.
- Overloading and collapsing the boom (i.e. using a man lift as a material crane).
- Making contact with electrical conductors with an un-insulated portion of the lift.
- Neglecting to deploy outriggers or brace sufficiently against tip-over.
- Making body contact with electrical conductors or entering the induction field.
- Operating the lift in inclement weather or low visibility conditions.
- Inexperienced or untrained operators.
- Unobserved, uncorrected mechanical or structural defects in equipment.

While some fatality victims were struck by objects, such as booms and platforms, a smaller percentage was crushed between either the carriage or the platform and some fixed structure.

Falls from the elevated platform seemed to be caused primarily by a worker’s unsafe acts, such as leaving gate chains unattached, propping the gate open, or climbing up on or leaning over the guardrail system.

Some even fell from step and extension ladders that were set up inside the platform.

## CHAPTER 1 OVERSIGHT:

There are many layers of oversight of safety requirements in the workplace that are often in a hierarchical form of priority. For example, federal laws and regulations normally supersede provincial authority, but in some instances the federal government has given authority to the provinces.

Goal:

The student will have an awareness of the various legislation, regulations, and standards that pertain to Mobile Elevating Work Platforms.

Objective:

1. The student should understand the relationship between Legislation, Regulations, Standards, Due Diligence, and Best Practices.

Students Notes

Legislation

Criminal Code of Canada Section 217.1

- One of the farthest-reaching mechanisms of oversight regarding health and safety is Section 217.1 of the Criminal Code of Canada, it is where “due diligence” is defined in law:

“Everyone who undertakes, or has the authority, to direct how another person does work or performs a task is under a legal duty to take reasonable steps to prevent bodily harm to that person, or any other person, arising from that work or task.”

Canada Labour Code Part ll

- In Canada OH&S is a provincial jurisdiction and every province has its own OH&S legislation, code, and regulations.
- However, some industries are federally regulated, which can bring OH&S for those industries under the Canadian Labor Code and under federal jurisdiction.
- Federal health and safety legislation are found in Part ll of the Canada Labour Code and Regulations.
- The Canada Labour Code applies to employees of the Federal Government, the Post Office, airports, banks, canals, highway transport, pipelines, radio and television broadcasting, railways, shipping services, and many more.
- All Provinces and Territories must meet the minimum requirements of the Canada Labour Code and Regulations in their own legislation and are certainly encouraged to exceed them.
- Approximately 90% of the Canadian workforce falls under the OH&S legislation of the province or territory in which they work.

Provincial Legislation and Regulations

The Alberta, Occupational Health and Safety Act, Regulations and Code applies to every occupation, employment and business.

Except for:

- family operated farming and ranching operations, and
- work in, to or around a private dwelling or its' connected land.

Alberta, Occupational Health and Safety Act,
Follow the link below and familiarize yourself with:

- Part 1 Obligations of Worksite parties; Sections 3 thru 13.
- Part 2 Availability of Information; Section 14.
- Part 4 Dangerous Work and Discriminatory Action; Sections 31 thru 36.

http://www.qp.alberta.ca/1266.cfm?page=O02P1.cfm&leg_type=Acts&isbncln=9780779800865&display=html

Alberta, Occupational Health and Safety Regulations
Follow the link below and familiarize yourself with:

- Part 1 General; Sections 7, and 12 thru 15.

http://www.qp.alberta.ca/1266.cfm?page=2003_062.cfm&leg_type=Regs&isbncln=9780779776221&display=html

Alberta, Occupational Health and Safety Code
Follow the link below and familiarize yourself with

- Part 2 Hazard Assessment.
- Part 7 Emergency Preparedness and Response.
- Part 9 Fall Protection; Sections 141 and 156.
- Part 18 Personal Protective Equipment.
- Part 23 Scaffolds and Temporary Work Platforms; Section 346
- Part 28 Working Alone.

Regulations

- Workplaces must meet the minimum requirements of OH&S Regulations but are also encouraged to exceed them.

- Whether the workplace simply meets or chooses to exceed the minimum of the Provincial regulations, the employer should document their regulations into the company's safe work policies and procedures manual.

Standards

- OH&S regulations often refer to standards where the regulation will require the worker to follow a specific standard or use equipment that has met the requirements of a specific standard.

- The standards organizations are not the government so they cannot implement regulations.

However, the standards organizations are made up of experts in various disciplines. The standards organizations most frequently referenced in OH&S regulations are:

- CSA Group, formerly the Canadian Standards *Association* (CSA) (CAN/CSA)
- American National Standards Institute (ANSI)

Others Include:
- American Society of Safety Engineers (ASSE),
- European Committee for Standardization (CEN), or in French: (Comité Européen de Normalisation) Conformité Européenne (CE),
- National Fire Protection Association (NFPA),
- Underwriters Laboratories (UL),
- Underwriters Laboratories of Canada (ULC),
- Safety Equipment Institute (SEI).

For compliance purposes, any equipment required to meet specific standards must bear the mark or label of a nationally accredited testing organization such as CSA or ANSI, as evidence that the equipment has been approved to the requirements of the Standard.


Use caution when purchasing equipment required to meet the various standards. Manufacturers must meet stringent criteria to have their equipment tested to these standards. There have been cases of fraud where equipment has not been tested to the standards criteria and counterfeit marks are placed on the equipment. It is always best to purchase equipment from reputable and authorized dealers.

The Bottom Line

When a regulation requires certain standards to be followed, they must be followed just as if they were written verbatim in the regulation.

Due Diligence

- Applied to occupational health and safety, due diligence means that employers shall take all reasonable precautions, under the particular circumstances, to prevent injuries or accidents in the workplace.

  Note: The wording is very similar in the Criminal Code of Canada Section 217.1.

Best Practices

- A best practice is a method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means, or because it has become a standard way of doing things.

- Best practices are used to maintain quality as an alternative to mandatory legislated standards and can be based on self-assessment or benchmarking.

- A procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption.

- There are some standards that are not required to be followed by any regulations, but individuals and groups follow them because they produce results.

Best Practice vs. Due Diligence

- If due diligence in health and safety means to take all reasonable precautions, and best practices are used to maintain quality as an alternative to mandatory legislated standards; then wouldn't following best practices be considered an example of due diligence?

- A standard not required through a regulation but has been generally accepted as superior could be considered a best practice and therefore should be followed to meet due diligence.

  Note: Can you think of an example of best practices and due diligence being followed at your worksite?

Reasonably Practicable

- In OHS the term "reasonably practicable" is frequently used.

- Reasonably practicable is a recognized term that is assessed using the reasonable person test.

- That is, what would a dozen of your peers consider reasonable in similar circumstances.

- Your peers would likely review what you did and compare it to what they do in their own operations.

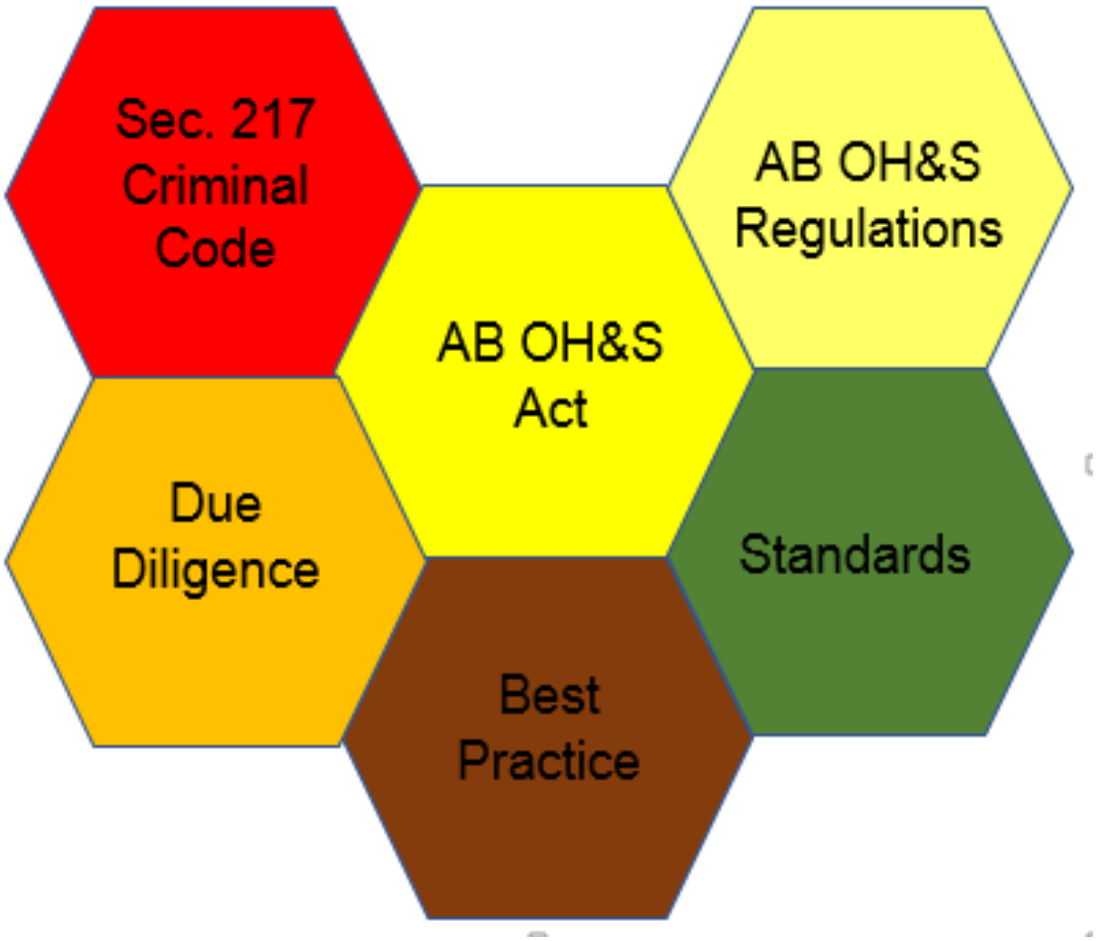
- Some might do more, others less.

Requirement to Comply

Notwithstanding the requirement for competency (training and experience), appropriate equipment, and the right to refuse unsafe work:

- If legislation, regulations, or an adopted code imposes a duty on an employer, the employer must ensure that duty is met in accordance with the legislation, regulations, or the adopted code.

- If legislation, regulations, or an adopted code imposes a duty on a worker, the worker must perform that duty, and the employer must ensure the worker performs that duty in accordance with the legislation, regulations, or the adopted code.




The Bottom Line

Employers and workers must ensure they understand under which authority they are working and be familiar with the legislation, regulations and standards they must follow.

Chapter 1 Summary:

What was covered in Chapter 1?

- The relationship between Legislation, Regulations, Standards, Due Diligence, and Best Practices.

# CHAPTER 2: ENSURING A SAFE WORKSITE

Goal:

The student will understand the roles and responsibilities of employers and employees and workplace programs as they relate to the operation of MEWP.

Objectives:

1. The student will be aware of employers' responsibilities as they relate to the operation of MEWP.

2. The student will be aware of employees' responsibilities as they relate to the operation of MEWP.

3. The student will be aware of the key elements of a health and safety program for MEWP operators.

Employer Responsibilities

- The primary purpose of OH&S laws is to keep workers safe. Under OH&S laws, employers are ultimately responsible for all persons on their worksite.

- Employers must develop safety policies and procedures for its workers.

Employee Responsibilities

- Employees must, while at work, make all reasonable efforts to ensure the safety of all persons at the worksite, including other workers, traffic and pedestrians.
- Employees have the obligation to refuse to work on a job or in any workplace, or to operate any equipment if they have reasonable grounds to believe that it would be unsafe or unhealthy to do so.

Slide 40 – Boom Lift Catapult Europe 2014 Video

An Organized Approach

- An organized approach through a company Health and Safety Management System is necessary to ensure all roles, responsibilities, and program requirements are met or exceeded.

  *The next sections of this course are based upon the key elements of a Health and Safety Management System.*

Key Elements of a Health and Safety Program for MEWP Operators

- Training, Information and Auditing.
- Management, Supervision and Internal Responsibility.
- Job Planning and Hazard Assessments.
- Safe Operating Procedures.
- Prevention of Injuries.
- Equipment Maintenance and Modifications.
- Facility Design.
- Additional safety training may include First Aid, WHMIS, Transportation of Dangerous Goods, Spill Containment, Ground Disturbance, Fire Safety, etc.

Further requirements the employer must comply with

- Specifications and Certifications (for equipment).
- Chemical Hazards, Biological Hazards and Harmful Substances.
- General Safety Precautions i.e. securing equipment and materials.
- Lifting and Handling Loads.
- Mobile Elevating Work Platforms.
- Fork-mounted Work Platforms.

Training and Information

- Although it is the employers' responsibility for the provision of training, employees are responsible to use that knowledge and participate in any company procedures regarding the safe operation of their equipment.
- Remember, no one can make you a safe operator, that is a choice that you make every time you operate equipment.

Operators Basic Safety Practices

- Always use the operator restraint system.
- Operate the equipment from the operator's compartment only.
- Use the equipment for its intended purposes only.
- Obey safe operating policies.
- Maintain a clear path of travel.
- Travel in reverse if forward vision is blocked or use spotters if they are available.
- Notify your supervisor immediately if you are involved in an incident which results in personal injury or damage to the equipment.

Emergency Actions

- An employer must establish an emergency plan for responding to emergencies at the workplace.
- The plan should be known and understood by all employees and trained so that they can react appropriately to the incident.

The Emergency Response Plan (ERP) should include:

  - The identification of potential emergencies.
  - Procedures for dealing with identified emergencies.
  - The identification, location, and use of emergency equipment.
  - The emergency response training requirements.
  - The location and use of emergency facilities.
  - The fire protection requirements.
  - The alarm and emergency communication requirements.
  - The first aid services required.
  - Procedures for rescue and evacuation.
  - The designated rescue and evacuation workers.

Training should also include understanding the procedures to follow in the event of an incident involving dangerous goods or controlled products.

The plan should also include the call-out details for the service engineer or other person who is competent.

- The emergency and rescue plan should identify trained, site-based personnel who would be available to lower the work platform using the control panel or emergency descent system situated at ground level.
- These people should be included in the familiarization training for the specific machines being used on site.

Job Planning

- Every worker should attend daily crew meetings (i.e. tail-gate, toolbox) at the beginning of their shift.
- The purpose of the tail-gate meeting is to discuss and plan the work assignments for the day, and complete necessary documentation.
- It also allows workers an opportunity to ask questions regarding their assigned tasks.
- It is critical that all affected workers participate and contribute to the discussions at these planning sessions.

  Taking the time to plan the job will save time and money, “Failing to plan is planning to fail”.

  It is the worker’s responsibility to ensure that they have a clear understanding of assigned tasks including any hazards associated with the task.

  Look at the ‘Big Picture’, discuss the over-all project and your role within it.

  Note power lines, temporary roads, traffic patterns, pedestrian paths, material storage, equipment lay-down areas, and where other equipment is working.

  Consider how your task may affect others, if others could be impacted by your assigned task discuss the issues with them and/or their foreman/supervisor.

  What other vehicles, mobile plant or work equipment could be close by?

  Look at where the other trades will be working later that day, week or month.

  Decide where you will work, where you will pile, load and place materials.

  Walk the jobsite; look for outbuildings, racks, and other obstructions that could interfere with your ability to operate safely.

  Ensure that Alberta First Call has been notified and have marked underground services prior to disturbing the ground.

  It is important to note that Alberta First Call doesn’t locate any private services that might have been installed by the property owner or the municipality, water shutoffs and such might need be located by a private utility locater service.

  Determine what equipment, tools and materials your task will require, and select proper equipment, material and tools.

  Ensure there are no conflicts with others’ tasks; if there are, alert your supervisor/foreman, so alternate arrangements can be made.

  If transporting the equipment, determine whether a pilot vehicle(s) will be required and, if so, arrange for such.

Operator's Manual

- MEWP operators must be familiar with the operator's manual for the specific equipment they operate.
- The information is vital for safe operation of the MEWP and outlines the equipment's safety concerns, safe operation and the equipment's maintenance requirements.
- Each piece of equipment must have an operator's manual available for it, if it doesn't then report this to your supervisor and order a new one.
- Read and follow the operators' manual.
- Observe all warning plates and decals on the equipment and in the operators' manual.
- The operator's manuals will explain any potential safety hazards whenever necessary in special messages that are identified with the word **DANGER**, **WARNING**, or **CAUTION**, and the safety alert symbol.

Memorize the meaning of the following boldface terms appearing in warnings in both the equipment manuals and on the equipment itself.

 **Danger!** Indicates a high probability of death or serious injury and/or serious equipment damage if the hazard is not avoided.

 **Warning!** Indicates a potentially dangerous situation that could cause injury or death and/or serious equipment damage if the hazard is not avoided.

 **Caution!** Indicates hazards that could result in minor or moderate injury or damage to the equipment.

Refer to the operator's manual for the following information:

- Main components of MEWP.
- Basic specifications.
- Safety and security.
- Operator's cab.
- Operating the machine.
- Maintenance.

Genie Scissor Lift

http://manuals.gogenielift.com/Operators/english/39527.pdf

Genie Boom Lift

http://manuals.gogenielift.com/Operators/english/32221.pdf

Know your MEWP

- Read and understand the Operator's Manual before using the equipment; if the manual is not on the machine – get one!
- Read, understand and follow the Danger, Warning, Caution and other safety signs on your equipment.
- Know the rated capacity, speed range, braking and steering characteristics, turning radius, and operating clearances.
- Know the purpose of all the controls, gauges, and dials.
- Know where fire extinguishers, first-aid, and emergency equipment are kept and where to get help if needed.
- Know the weight of your loads and do not, at any time, exceed the rated capacity of the machine.
- Make sure your equipment is ready for the job it must do; ensure equipment has been examined, inspected, maintained and daily checks completed.

Hazard Assessment

- OH&S Code Part 2 requires hazard assessments to be conducted to identify existing or potential hazards before work begins, at regular intervals and when anything changes that could affect the safety of the worksite.
- A report must be filled out listing the results of the hazard assessment and the methods used to control or eliminate the identified hazards.
- Equipment operators and supervisors must be involved in the hazard assessment process.
- Each job site has its own unique operating hazards and site considerations.
- Every equipment operator should take the time to assess every job site every time work begins for the day, shifts to a new location, or when a new job on the same site commences.
- Once a hazard has been identified, a worker is required to follow safe work procedures to avoid causing damage or injury at the worksite.
- Participate and Contribute to Discussions:

    Ask questions of task assignment and how your job fits in with overall job.

    Discuss your role with supervisor/foreman and co-workers.

    Develop a work plan that accounts for others' tasks and reduces or eliminates risks to others that could be created by your task's hazards.

    Assess and discuss specific task and/or site hazards; introduce new information as needed.

Consider the impact of worksite hazards such as:

- Slopes and inclines
- Ground conditions
- Moisture
- Soil stability
- Debris
- Loose gravel
- Vehicle and Pedestrian Traffic
- Other people and equipment working in the area
- Other PME
- Animals
- Fog or mist near lakes and ponds

Be alert for changes that may impact your task or those of your co-workers.; if any significant changes are noted, inform your co-workers.

Check the Work Area

- Check the ground or floor over which you will travel and work. Look for obstructions, holes, debris, obstacles, drop offs or rough spots.
- Weak spots or covers on ramps and floors.
- Oil spills, wet spots, slippery surfaces, soft soil and standing water.
- Soft, uneven surfaces or anything that might make you lose control or cause you to tip over.
- Check the clearances overhead and of doorways and canopies. Also, check clearances when transporting your equipment on a truck or trailer.
- Know exactly how much clearance you have around electric power lines. Never move equipment closer than 3 m (10ft) plus twice the line insulator length to overhead wires.

Assess weather conditions.

- If working outdoors, a detailed weather forecast should be accessed each morning. It is critical that weather is discussed during the planning sessions.
- Be prepared to adjust tasks, people and/or equipment if weather changes. If a weather change is expected, discuss the potential impact with the crew.
- Rain, snow, ice, etc., can change the operating characteristics and capabilities of your equipment and require extra caution during operation.

Chapter 2 Summary:

What was covered in Chapter 2?

- Employers' responsibilities as they relate to the operation of MEWP.
- Employees' responsibilities as they relate to the operation of MEWP.
- Key elements of a health and safety program for MEWP operators.

# CHAPTER 3: FALL PROTECTION FOR MOBILE ELEVATING WORK PLATFORMS

Instruction of Workers; OH&S Code Part 9, Section 141 states that an employer must ensure that a worker is trained in the safe use of the fall protection system before allowing the worker to work in an area where a fall protection system must be used.

Goal:

The student should have a basic understanding of fall protection for MEWP.

Objectives:

1. The student should understand the fall protection systems a worker is required to use when working from a MEWP.

2. The student should understand the major components of the fall protection systems a worker is required to use when working from a MEWP.

3. The students should understand the fall hazards associated with working from a MEWP.

4. The students should understand the importance of the pre-use inspection of fall protection equipment used when working from a MEWP.

5. The students should understand the Effects of a fall on the human body.

6. The students should understand the Emergency response procedures necessary when working from a MEWP.

7. The students should understand the contents and application of a fall protection plan as it pertains to working from a MEWP.

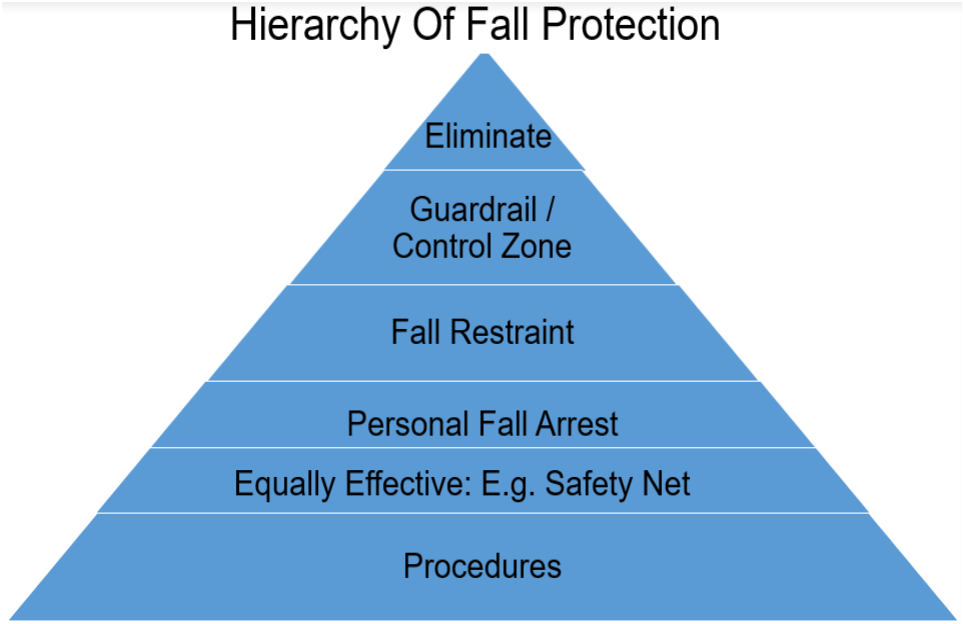
8. The student will practice inspecting, fitting, adjusting and connecting fall protection systems and components used when working from a MEWP.

Fall Protection Systems

- In Alberta fall protection is required if work is performed at a work site at which a fall of 3 metres (~10 ft.) or more may occur, or where there is an unusual risk of injury.
- All equipment must meet all standards as required by the regulations

Hierarchy of fall protection

- There are six options for fall protection.
- The worker must choose the option with the least risk that will allow the worker to safely complete the task.




- It would not be practicable to use safety nets and procedures are not an acceptable means of fall protection when working from an MEWP.
- Alberta OH&S Regulation Part 9 Section 156 (1-2) requires that a fall restraint system be used on elevating work platforms in Alberta workplaces.

Fall Restraint

- The purpose of a fall restraint system is to stop the worker from reach the fall hazard.
- In the case of MEWP the fall restraint system stops the worker from falling or being ejected from the man basket.

- The fall restraint system consists of a full body harness and lanyard connected to an anchor specified by the manufacturer of the MEWP.
- When connected to the anchor, the lanyard, if reasonably practicable, is short enough to prevent the worker from falling out of the scissor lift or elevating work platform but is long enough to allow the worker to perform his or her work.
- Using a self retracting device designed for use with an MEWP (anchor point below the D-ring) is acceptable for fall restraint in a MEWP.

Personal Fall Arrest System

- Alberta OH&S Regulation Part 9 Section 156(4) also states that if a worker's movement cannot be adequately restricted in all directions by the travel restraint system, the employer must ensure that the worker uses a personal fall arrest system.
- The reason why fall restraint is the first option for fall protection in a MEWP is that with a PFAS the worker may be ejected and fall.
- The possible ejection and fall introduces the hazard of arrest force among others.
- Due to the arrest forces that may be generated in a fall, precautions must be taken to reduce the amount of arrest force that the worker could be exposed to.
- Two main methods of reducing the arrest force the worker could be exposed to is by limiting the free fall distance and using an energy absorber.
- Free fall distance means the vertical distance between the point from which a worker falls to the point at which deceleration begins because of the action of a personal fall arrest system.
- Free fall distance in a personal fall arrest system WITHOUT a shock absorber must not exceed 1.2 metres (~4 ft.).
- Free fall distance in a personal fall arrest system WITH a shock absorber is determined by the manufacturer of the shock absorber.
- Working from a MEWP the free fall distance is calculated by adding the lanyard length plus the distance the anchor is below the D-ring.
- To reduce the free fall distance then you must shorten the lanyard and/or use the highest available anchor point in the MEWP.

MEWP Anchors

- All boom style machines are equipped with anchors.
- Some scissor lifts may have anchors, and some may not.
- The purpose of the anchor is for the operator to attach their fall restraint system to.
- If the operator is not attached to the anchor in a boom style machine the operator could be catapulted out of the platform and suffer severe injury.
- Anchors are not designed to have more than one person attached at a time.

- The guard rail on an elevated work platform must not be used as an anchor point.
- Due to the possibility of equipment failure or unintentional movement of the MEWP you should never anchor to an object outside of the platform.
- Follow the manufacturer's instructions for the proper inspection and use of the anchor in a MEWP.

Swing-Fall

Swing fall is a hazard associated with the location of the anchor point.

When working from an MEWP the only way to control swing fall is by eliminating the possibility of swing fall by using fall restraint.

Scissor Lifts without Anchor Points

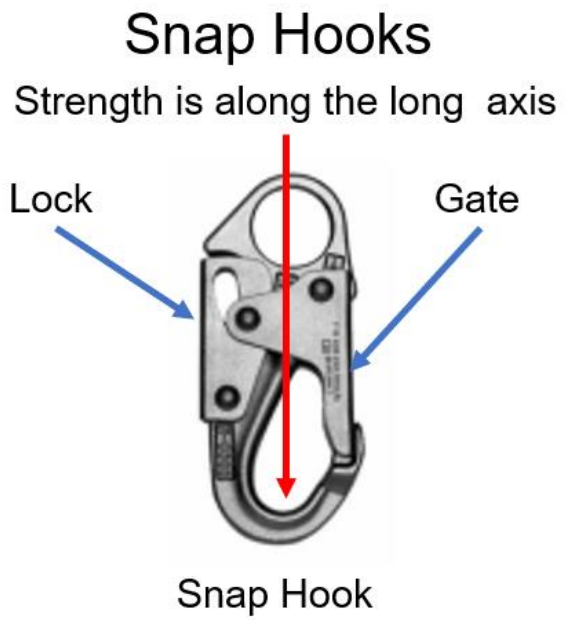
- Some older scissor lifts were manufactured without anchor points.
- The manufacturers instructions for use must state that the scissor lift's guardrails as a means of fall protection is acceptable.
- The operator's manual must be with the scissor lift.
- The scissor lift must be operating on a firm, substantially level surface.
- Guardrails and railings are not anchor points.

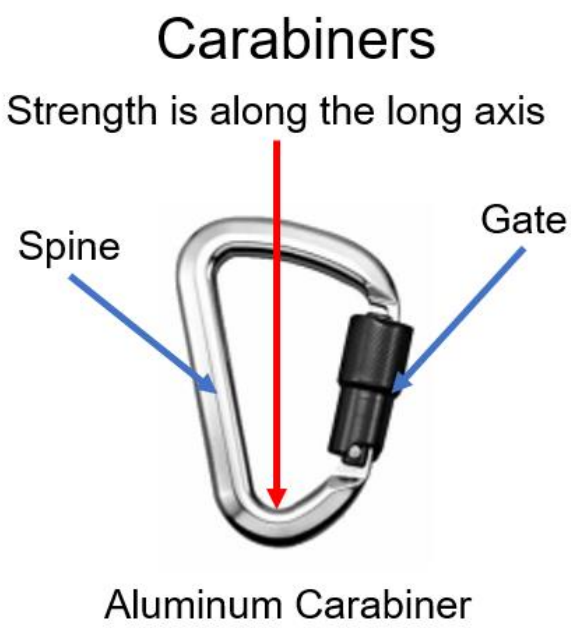
Connecting Equipment

- Equipment used to interconnect the components of a personal fall arrest system are subjected to the full maximum arresting force developed during a fall.
- An employer must ensure that connecting components of a fall arrest system are approved, as applicable, to one of the required standards.

Carabiners and Snap-Hooks

- Must be self-closing and self-locking,
- May only be opened by at least two consecutive deliberate manual actions, and
- Must be marked with
    - its breaking strength in the major axis, and
    - the name or trademark of the manufacturer.



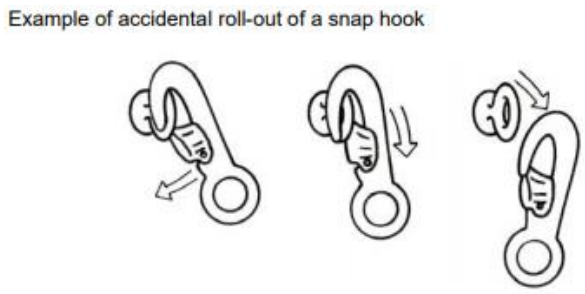



Hazards Associated with Connecting Equipment

- Compatible system components can be safely interconnected, e.g., carabiners and harness D-rings, ropes and ascenders, etc., without compromising equipment function or worker safety.
- It is also important that components be compatible with the environment in which they are being used, i.e., high heat, corrosive, exposed to welding spatter, etc.

Roll-out & Forced Roll-out

- Snap-hooks and Carabiners should never be positioned where arrest forces may be placed upon the gate.
- When a force is applied on the top of a non-locking gate, the gate opens, releasing the mating hardware.
- The most typical roll-outs have been known to occur between snap hooks and D-rings.




- Although no manufacturer in North America or Europe uses non-locking snap hooks anymore, thousands of them may still be in service.
- Employers must remove this equipment from use and storage if it is used or could be used for fall protection.
- Locking snap-hooks DO NOT “eliminate” forced roll-out, only proper orientation and compatibility can eliminate this hazard.

Improper or Incomplete Connection (False Connection)

Connecting components can create a serious hazard when they engage improperly or incompletely.

Such a hazard is possible when the internal dimensions of the D-ring of the full body harness or body belt are very close to the external dimensions of the snap hook being connected to it

Gate cross-loading

Snap hooks and carabiners are designed to handle maximum loads in line with their long axes.

However, because of their shape or circumstances of use, e.g., loops of webbing or rope coming to rest across the gate and then being placed under tension, snap hooks and carabiners can be subjected to gate cross-loading, resulting in much lower breaking strengths.

Connections between hardware components must be made carefully when using snap hooks and especially carabiners.

## Controlling Hazards Associated with Connecting Equipment

- Ensure equipment meets required standards.
- Follow manufacturer's instructions for proper selection, use, maintenance, and inspections.
- Only use equipment that is compatible with other components.
- Only use equipment that is compatible with the hazards and environment it maybe exposed to.
- Ensure you are competent in the use of all equipment you use.

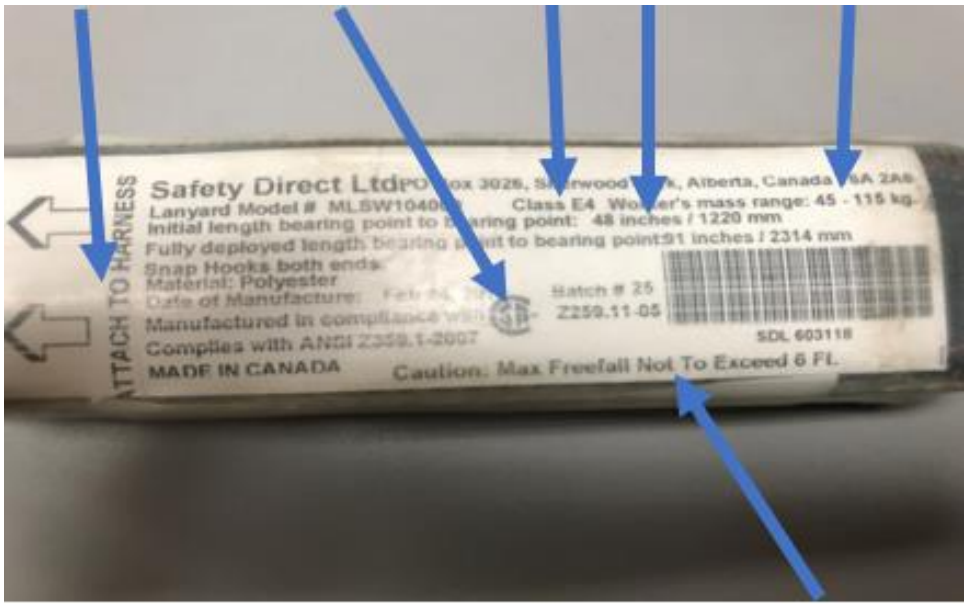
Lanyards and Energy Absorbers

- A lanyard is a flexible line of webbing or synthetic or wire rope that is used to secure a full body harness or safety belt to a lifeline or anchor point.
- There are different types of lanyards; Elastic, Twin Leg, Adjustable, and lanyards designed to be tied-back on itself (Chokered).
- Lanyards can be made of various materials each with their own attributes making each one more desirable for use in different environments.

Energy Absorbers

- CSA created the two ratings to better protect workers of different body weights known as E4 and E6.

| Category | Weight Range | Maximum Arrest Force |
|---|---|---|
| E4 | 45-115 kg (100-254 lbs) | 4 kN (900 lb) dry<br>6 kN (1350 lb) wet and frozen |
| E6 | 90-175 kg (200-386 lbs). | 6 kN (1350 lb) dry<br>8 kN (1800 lb) wet and frozen |



The energy absorber is always attached closest to the body.

**NEW**

In January 2017 CSA eliminated Class E4 and E6 Energy absorber.

- Existing Class E4 and E6 Energy Absorbers may continue to be used until the end of their life.
- Energy Absorbers manufactured to meet the January 2017 CSA Standard will have a weight range, maximum free fall distance

Slide 110– Arrest forces video

Self Retracting Device

- A self-retracting device (SRD) is a fall arrest device that performs a tethering function while allowing vertical movement (below the device) to the maximum working length of the device and are designed to arrest a fall while minimizing fall distance and impact force.
- There are 3 types of SRDs

| Self-Retracting Devices | | | | |
|---|---|---|---|---|
| **Type** | **Length** | **Annual Inspection** | **Load Indicator / Arrest Indicator** | **Retrieval Function** |
| Type 1 | 1.5 – 3.0m (~5 ft. to ~10 ft.) | Not mandatory | Not Mandatory | No |
| Type 2 | > 3.0m (~10ft) | Required | Required | No |
| Type 3 | > 3.0m (~10ft) | Required | Required | Yes |

- The only SRD that is suitable for use in a MEWP is a Type 1.
- Because the anchor point in a MEWP is below the D-Ring the SRD must be designed for that purpose.
- Workers should field test the locking feature of an SRD before using it by pulling down on the line quickly and forcefully.
- If the device does not lock or the visual load indicator has been activated, the SRD should be removed from service and returned to the manufacturer for re-certification.

NEW!

In January 2017 CSA eliminated Type 1, 2, and 3 SRDs.

- Existing Type 1, 2, and 3 SRDs may continue to be used until the end of their life.
- New SRD Classifications will be determined by the anchor location.
- Inspection criteria will be determined by frequency of use and severity of conditions.

Correct selection and use of fall protection equipment.

- Choose an adjustable lanyard with an integrated energy absorber or an SRD designed for use in a MEWP.
- Keep the lanyard as short as possible, using keepers to control extra webbing.
- Always attach the energy absorber to the D-Ring.
- Ensure the snap-hook that attaches to the anchor in the MEWP is compatible with the anchor and is fully closed and locked.

Clearance Distance

- A personal fall arrest system must be arranged so that a worker cannot hit the ground or an object which poses an unusual possibility of injury, or a level below the work area.
- There must be enough clearance distance including a safety factor.
- Required clearance (RC) is calculated by adding the lanyard length (LL), plus the deceleration distance (DD) (energy absorber extension), plus the height of the worker (H), and a safety margin (SM).

The formula looks like this: LL + DD + H + SM = RC

- Deceleration is zero if a self retracting device is used.
- Height of the worker is how tall the worker is.
- Safety margin is commonly 2ft. but some equipment requirements may vary.
- The RC must be less than the distance between the anchor and the hazard below.
- Do not assume the lanyard will be strung over the guardrail of the MEWP as the guardrail may collapse under the impact of the worker falling.

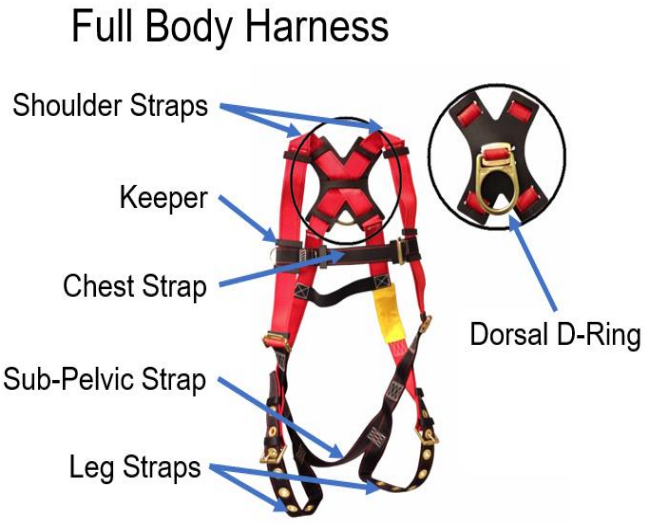
Slide 117 – Ejection from boom lift - Video

Correct selection and use of a harness.

- The only acceptable style of harness for fall protection is a full body harness.

- Full body harnesses have four main functions:

- to securely hold the worker's body during free fall, deceleration and final arrest;
- to distribute arrest forces to those parts of the body able to absorb the forces without significant injury.
- to keep the body in an upright or near upright position after the fall and until the worker is rescued; and
- to allow workers to do their work without restricting their movement.




- Verify that your equipment meets all required standards.
- Know your hazards and environment and select equipment that is compatible with the environment and hazards you may be exposing them to.
- Some manufacturers use universal sizing (one size fits all). Others use weight range and height which will probably result in the safest and most comfortable fit.
- You need to find a harness that is comfortable for you to wear when it is adjusted for safety.
- Before buying a harness find out where the harness is made and verify that the harness meets all required standards.
- Avoid harnesses with only use loop & hook (Velcro) to secure the straps.
- Buy the right harness for the job; harnesses come with a wide range of D-Ring locations, each used for different applications.
- The Canadian Standards Association (CSA) establishes the classifications for full body harnesses.
- The Class of harness designed for fall protection in a MEWP is a Class A Fall Arrest harness (Dorsal D-ring).

Fall Protection Equipment Inspection and Maintenance

- It is essential that all load-bearing equipment is inspected before each use to ensure it is in safe condition and operates correctly. The manufacturer's specifications should be consulted to determine the equipment's inspection and maintenance requirements.
- It's called a visual inspection for a reason; you can't inspect what you can't see.

Equipment used as part of a fall protection system must be:

- Inspected by the worker as required by the manufacturer before it is used on each work shift,
- Kept free from substances and conditions that could contribute to deterioration of the equipment, and
- Re-certified as specified by the manufacturer.

How does equipment get damaged?

- Prevent damage to your equipment by understanding the hazards you may be working with, and how those hazards may damage your equipment.
- Nylon and polyester have different attributes that can make them suitable or unsuitable for exposure to greases and oils.
- Exposure to Ultra-Violet light (sun, lighting, welding arcs,) can cause damage that may be difficult to see but can be detected by touch.
- Keep your equipment away from or protect it from damage by coming into contact with sharp edges and chemicals.
- Don't put your equipment away wet, mildew can damage webbing and rust can damage metal components.
- Put your equipment away dry and store it properly.

Always follow manufacturers' instructions for the proper inspection, use, and maintenance of your equipment

Manufacturer’s inspection

- In addition to the inspection required before each use the equipment must be inspected as required by the manufacturer.
- Most manufacturers require fall protection equipment to be inspected on a regular basis not to exceed one year, or more frequently, by a competent person (as defined by the equipment manufacturer), to verify that the equipment is safe for use.

Elements of a visual inspection

- Always follow the manufacturer’s instructions)
- Check the date of manufacture, if it meets the requirements of the manufacturer proceed with the remainder of the inspection.
- Check for missing or illegible tags.
- Check for missing webbing stays (keepers) or anything that might affect the equipment fit or function.
- Check all metal components for missing components (i.e. grommets, rivets), cracks, deformities, corrosion, chemical exposure, excessive heat, discoloration, or excessive wear.
- Check webbing and ropes for heat damage (burns, friction, welding arcs, sparks) fraying, un-splicing, kinks, knots, broken stitching, cuts, excessive abrasion, excessive oil or grease contamination, ultra-violet light, discoloration.
- Check all equipment for any alterations.
- Check for damage to, or improper function of, mechanical devices and connectors such as snap-hooks, or carabiners.

For compliance purposes any equipment required to meet specific standards must bear the mark or label of a nationally accredited testing organization such as CSA, ANSI, CEN.


Be sure to review slides 139-152

Removal from service protocol

- Fall protection equipment that is damaged, fails an inspection, or shows signs of being used in a fall (signs of stretching, deployed arrest/fall indicator) must be removed from service.
- Once removed from service it must not be returned to service unless it has been repaired by an authorized and competent person (as defined by the equipment manufacturer).
- Equipment that is no longer suitable for use that cannot be repaired, must be destroyed and made inoperable or unusable before it is discarded.

Note: Instructor Guided Full Body Harness Inspection

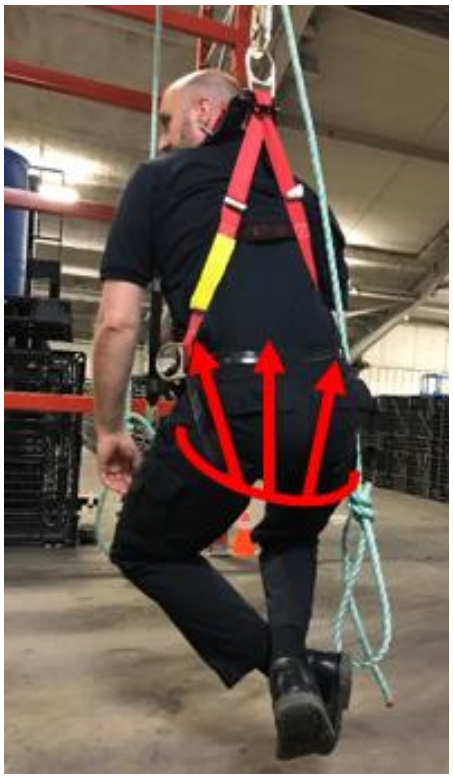
Prior to donning the harness, the harness to be worn will be inspected by the student with guidance from the instructor.

Full Body Harness Donning

- The strongest part of your body is located where the two biggest bones (Femur and Pelvis) are surrounded by the biggest muscles in your body.
- To ensure that arrest forces are directed upward into the buttocks. It is important to follow this sequence of steps when donning your full body harness.

Step 1: Sub-Pelvic Strap.

- Remember the goal is to ensure that arrest forces are directed upward through the sub-pelvic strap (“Butt Strap”) into the buttocks. Positioning of the sub-pelvic strap is critical for safety.
- The sub-pelvic strap is raised or lowered by adjusting the length of your shoulder straps.
- Ensure the sub-pelvic strap is just below the buttocks. If the sub-pelvic strap is too low it will not “grab” your buttocks during the fall and will allow the arrest force to impact the worker’s groin through the leg straps. If the sub-pelvic strap is too high the same result may occur.
- After you have adjusted the sub-pelvic strap, ensure your shoulder straps are the same length and the ends are across from each other. That will ensure your sub-pelvic strap goes straight across just below your buttocks.
- Be sure to control the extra webbing from your shoulder straps with the webbing-stays (keepers).



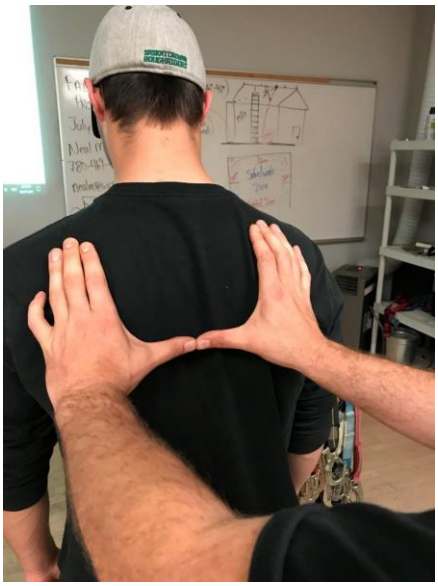
Step 2: Leg Straps

- The purpose of your leg straps are to hold the sub-pelvic strap in place.
- Once the sub-pelvic strap is in place, bring the leg straps through between your legs, make sure the leg straps are not crossed over or twisted.
- The leg straps should be snug, but not too tight.
- When properly adjusted you should be able to slide your flat hand through between your thigh and the leg strap, but not be able to bring your hand in a fist position back through between the strap and your leg.
- Leg straps should be equally tensioned on each side.
- Be sure to control the extra webbing from your leg straps with the webbing-stays (keepers).

Step 3: Chest Strap

- The purpose of your chest strap is to keep you in the harness when you fall.
- The chest strap needs to be positioned correctly and tensioned properly so that you cannot move your shoulder straps off your shoulders.
- The chest strap needs to be on top of your chest, but no higher than your arm pit.
- Test by pulling your shoulder straps outward toward your shoulders, you should not be able to get the shoulder straps off your shoulders.
- Be sure to control the extra webbing from your chest strap with the webbing-stays (keepers).

Step 4: D-Ring Positioning



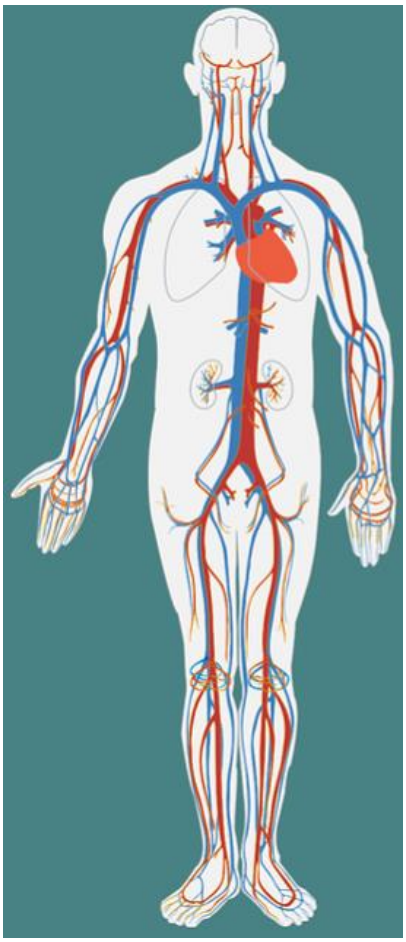
- The D-Ring used for personal fall arrest or Fall Restraint is the dorsal D-ring.
- It must be located in the centre of your back between your shoulder blades.
- The height of the D-Ring can be adjusted by pulling up or down one side at a time.
- The D-ring can be centred by lining up indicators on either side of the straps on your back.

Step 5: Partner Check

- A partner check should be conducted to ensure all components are in the right position and straps are not crossed over or twisted.
- Adjustment of the D-Ring is best done by a partner.
- Your partner can check the D-Ring position by placing their hands on your back with their fingertips at the top of your shoulders and joining their thumbs. Where their thumbs join is where the bar on the D-Ring should be.
- Your partner can line up indicators on the back straps and verify the D-Ring is in the centre of your back. If your partner has trouble centring the D-Ring they should check the shoulder straps and ensure they are adjusted symmetrically.

Effects of a fall on the human body:

- Injuries due to a fall will vary depending on the distance a person falls, body weight, orientation of the body upon impact, and the nature of the surface impacted.
- The distance of the fall is the major determining factor.
- As a person falls the kinetic energy increases due to acceleration during the fall and is at maximum at the moment of impact.
- The kinetic energy is transferred into the body causing the injuries.
- A fall will almost always result in injury, from very minor scrapes, cuts, bruises and abrasions to moderate injuries such as fractures of long bones.
- Arrest forces may result in heavy organs such as the heart, liver, kidneys, and spleen to tear away from blood vessels.
- Concussion and brain injuries are also possible.
- Blunt force trauma may result in internal and external hemorrhage as well as fractures to the skull, and other bones.
- Landing on objects may cause penetrating injuries.
- More severe injuries including injuries up to and including death are possible.



Suspension Trauma

- AKA – harness hang syndrome (HHS), suspension syndrome, orthostatic intolerance, harness induced pathology, or orthostatic shock while suspended.

What is suspension trauma?

- Suspension trauma is an effect which occurs when the human body is held upright without any movement for a period of time.
- If the person is strapped into a harness or tied to an upright object, they will eventually faint.
- Fainting while remaining vertical increases the risk of death from lack of oxygen to the brain.

*(Since there is no evidence that these effects are specifically due to trauma, or caused by the harness itself, climbing medicine authorities have argued against the terminology of suspension trauma or harness hang syndrome and instead termed this simply "suspension syndrome").*

What causes suspension trauma?

- The most common cause is accidents in which the person remains motionless suspended in a harness for longer periods of time.
- Motionlessness may have several causes including fatigue, hypoglycemia, hypothermia or traumatic brain injury.

What are the symptoms of suspension trauma?

- Onset of symptoms may be after just a few minutes, but usually occurs after at least 20 minutes of free hanging.
- Typical symptoms are paleness, sweating, shortness of breath, blurred vision, dizziness, nausea, hypotension and numbness of the legs.
- Eventually it leads to fainting, which may result in death due to oxygen deprivation of the brain.

Reducing the effects of suspension trauma:

- Breath, full deep respirations.
- If someone is stranded in a harness, but is not unconscious or injured, and has something to push against or stand on it is helpful for them to use their leg muscles by pushing against it every so often, to keep the blood pumping back to the torso.
- If the person is stranded in mid-air, then keeping the legs moving can be beneficial.
- Use of suspension straps or simply a loop in a rope in which the person hanging can take some weight off the leg straps to help the blood to flow.

What can you do while waiting to be rescued?

- Breath.
- Use suspension relief straps
- Move your legs.
- Bring your knees toward your chest.
- Get your foot up on a near by structure.

How important is a proper harness fit and adjustment?

How important is rescue?

Emergency response procedures when working from a MEWP.

Use Of 9-1-1 for rescue

In the case of rescues involving workers suspended in the air after a fall, calling 911 alone and awaiting the arrival of rescue services personnel is considered to be an insufficient emergency response.

- The employer must have some basic level of on-site rescue capability if rescue services personnel are delayed or unable to attend the scene (see section 140 for fall protection).

- Verify resources and capabilities of local emergency services

- If the suspended worker cannot be reached from the ground a high angle rescue team must be deployed.

- In some situations, rescue services personnel may not have the equipment or skills to perform a rescue.

    *e.g., a worker in a confined space deep below ground level in a horizontal tunnelling operation, or a worker suspended 50 metres (~165ft. ft.) above ground level following the failure of a MEWP*

- In such cases, the employer's on-site rescue capability must be such that the work site is virtually self-sufficient in returning a rescued worker to the surface or ground level.

Initial response to a worker who has fallen

- Speed is of the essence; this is truly a life-threatening emergency.
- The actions taken must be purposeful and well thought out.
- A well-documented plan must be developed, shared with anyone who it may impact (management, workers, responders, etc.).

1. Warn others, ensure the safety of all workers.

2. Call for help, initiate the site emergency response plan (ERP) and Rescue Plan.

3. Assess the situation and resources available to respond.
- Maintain the safety of the emergency site where the incident has occurred by identifying and controlling any critical hazards.
- Have a worker meet emergency responders and show them a safe way in to access the emergency site.
- Allow a co-worker to maintain contact with the casualty to provide reassurance and remind the casualty what to do while waiting to be rescued.
- Do not allow co-workers who are not properly equipped or trained to perform the rescue.
- Do not experiment with equipment or procedures that have not been thoroughly thought out and with which training and drills have been carried out.
- Know the limitations of lifts and other equipment. Platform must accommodate a casualty laying down and have sufficient capacity for the casualty and rescuers.

4. When safe to do so, proceed with the rescue, or wait for emergency services to arrive.
- Workers involved in rescue must be competent and properly equipped.
- Once the rescue is complete, take the casualty to a safe location.

5. Persons qualified in first-aid should provide first-aid until arrival of emergency medical personnel. There is no first-aid treatment protocol specifically for a worker who has been suspended in a harness.
- If a spinal injury is suspected the first aider should maintain spinal motion restriction.
- Treat for shock by providing warmth.
- If conscious, place the patient in a position of comfort.
- If unconscious, place the patient in recovery position.
- Watch for vomiting, an unconscious patient is at risk of aspiration (vomit entering the airway). An unconscious patient who is vomiting should be rolled onto one side. Take extra care in rolling a patient with a suspected spinal injury.
- Constantly monitor the patient.

6. Ensure all appropriate authorities have been notified as per the ERP.
- Document, document, document
- Cooperate fully with police, and/or OH&S Investigators.

Follow-Up

- Ensure co-workers are debriefed and receive any assistance they may require.
- Police services may be able to offer assistance through victim services.
- Before allowing work to begin after an incident, replenish all first-aid and rescue supplies and equipment.
- When appropriate, review the incident and ensuing response, and make any revisions to the ERP or Rescue Plan that may be necessary.

Fall Protection Plan

- A fall protection plan is NOT required:
  - At permanent work areas equipped with guardrails.
  - In situations involving the use of a boom-supported elevating work platform or the use of a fork-mounted elevating work platform intended to support a worker.
- The reason a fall protection plan is not required for MEWP is based on the following assumptions:
    - Using fall restraint eliminates the possibility of a fall.
    - If the worker is using fall arrest and does fall out of the basket, ground personnel can easily lower the basket to the ground

It is recommended that a fall protection plan be developed for MEWP.

- Section 14 of the OH&S Act requires that the plan be in writing and a copy is readily available for reference by workers, the joint work site health and safety committee and the health and safety representative, if there is one.
- The plan must be available at the work site before work with a risk of falling begins.

The fall protection plan must specify the following information:

- The fall hazards at the work site;
- The fall protection system to be used at the work site;
- The anchors to be used during the work;
- That clearance distances below the work area, if applicable, have been confirmed as sufficient to prevent a worker from striking the ground or an object or level below the work area;
- The procedures used to assemble, maintain, inspect, use and disassemble the fall protection system, where applicable; and
- The rescue procedures to be used if a worker falls and is suspended by a personal fall arrest system or safety net and needs to be rescued.
- Workers affected by the fall protection plan must be trained in all its elements and the plan must be made available to them.
- A unique fall protection plan need not be created for each work site.
- If an employer faces the same fall hazards at multiple work sites, and the fall protection equipment and rescue procedures are identical at each work site, then a single plan applicable to all the work sites is acceptable.
- Alternatively, an employer can create a single fall protection plan that covers all the fall hazards likely to be encountered during normal operations.

**Fall Protection Plan (Template)**

| |
|---|
| **Fall Hazards; Identify all existing and potential fall hazards on the work site** |
| |
| |
| |
| **Fall Protection System; Fall Restraint, Personal Fall Arrest System, etc.** |
| |
| |
| |
| **Anchors to be used; Identify all Engineered and temporary anchors to be used by the workers** |
| |
| |
| |
| **Clearance distances below the work area have been confirmed as sufficient**<br>**Clearance distances need to be confirmed by measuring and calculating** |
| |
| |
| |
| **Procedures used to assemble, maintain, inspect, use, and disassemble the fall protection system,** |
| |
| |
| |
| **Rescue Plan; Detailed procedures to be used if a worker falls and needs to be rescued.** |
| |
| |
| |

Voluntary Full Body Harness Suspension

- Instructor must remind the students that safety violations are strictly prohibited (horseplay, swinging, pushing, etc.) and will result in an automatic fail of the course without a refund.
- Instructor has verified the system being used is safe.
- Instructor has verified there is no reason the student should not suspend in the harness.
- Instructor verifies the student's harness is being worn properly.
- Student being suspended must be directly below the anchor.
- Student connects snap-hook to harness.
- Instructor reminds the student not to drop into the harness but sit down slowly.
- Student sits down gently in the harness and brings knees toward the chest.
- Maximum suspension time 1 minute

The End.