UNIVERSITI MALAYSIA PAHANG
AL-SULTAN ABDULLAH

OPERATIONAL CONTROL PROCEDURES

TITLE : WORKING AT HEIGHT

REVISION HISTORY

REV	DESCRIPTION	COMPILED BY	DATE
A	NEW RELEASE	OSHMO	08 NOV 2021

APPROVALS :

MESYUARAT JKKP UMPSA
BIL.03/2021 08 NOVEMBER 2021

1.0 PURPOSE (S)

1.1 The purpose of this procedure is to provide a guideline for working at height and definite assignments of roles and responsibilities.

2.0 SCOPE

2.1 This procedure shall apply in the event of working at height is needed at UMPSA.

3.0 REFERENCE (S)

3.1 Guidelines For The Prevention Of Falls At Workplaces
3.2 Code Of Practice For Working at Height by WSH Council

4.0 DEFINITION (S)

No.	Terms	Descriptions
4.1	OSHMO	Occupational Safety & Health Management Office
4.2	PTJ/RP	Responsibility Centre / Student Residential College
4.3	UMPSA	Universiti Malaysia Pahang Al-Sultan Abdullah
4.3	Working at height	Where any person is required to work at the place from which he will be liable to fall from distance of more than ten (10) feet.

5.0 RESPONSIBILITY AND AUTHORITY

No.	Person In Charge	Responsibility and Authority
5.1	Staff, students, contractors/subcontractors	a. To comply with all procedures stated in this document
5.2	PTJ/RP	a. To ensure implementation and enforcement of this procedure. b. To provide adequate personnel and resources to ensure proper implementation of this procedure. c. To carry out inspection/audit to determine PTJ/RP's compliance to this procedure. d. To provide user with adequate information and/or training.
5.3	OSHMO	a. To monitor compliance of this procedure.

6.0 PROCEDURES

6.1 Falls from height are a significant problem, resulting in serious injury and death of workers. For the victims, their families and community, each injury is one too many. It is not involved with the fall workers but fall of materials and others could also lead to serious injuries. The law requires that where work cannot be done safely from ground, access equipment must be provided. The term access equipment covers ladders, steps, lightweight platforms, skylift and scaffolding

6.2 The risks associated with working at heights must be controlled. The following should be considered as general guidelines in implementing control measure for working at height .It is essential in all cases to be able to:

a. Select the right piece of equipment for the job
b. Check it is sound
c. Erect it properly
d. Use it safely

6.3 Permit to Work for Working at Height

6.3.1 The permit-to-work system is a formal documented process used to manage work identified as potentially hazardous.

6.3.2 The permit-to-work system aims to:

a. Ensure a systematic and tiered authorisation for hazardous work;
b. Enable responsible persons to be aware of all hazardous work conducted, their locations in the workplace and when the work cease;
c. Establish a standardised approach with clear individual responsibilities to take all reasonably practicable measures to ensure the task can be carried out safely;
d. Enhance supervision of hazardous work with routine monitoring of the work; and
e. Provide a visual display (of permit) to clearly identify locations of approved tasks and task durations.

6.3.3 Requirement & Scope

a. A permit-to-work is required for work at heights where a person could fall from a height of more than 10 feet (3 metres), including falling into depth (referred to as hazardous work at heights).

b. For work at heights where the risks of falling more than 10 feet (3 metres) have been mitigated through adequate and effective edge protection, a permit-to-work may not be required, unless the responsible person deemed it should not be exempted.

c. The permit can be used for multiple work areas only if it has been assessed that the work areas share similar fall from height hazards, and that the control measures taken are applicable and effective in all the work areas covered by the permit.

d. Permit-to-work for working at heights is provided in Appendix 1. Please fill up the permit form & submit to OSHMO for approval.

e. Buddy system

6.3.4 Implemention

a. A permit-to-work is not simply permission to perform a hazardous task. The permit, by itself, does not make a task safe.
b. The safety enhancements can only be achieved through the persons preparing for the job (e.g., control measures implemented), persons supervising the job (e.g., ensuring that Safe Work Procedure are prepared) and persons performing the job (e.g., using PPE as intended).

c. Providing adequate training for all levels of persons involved in a permit-to-work system is essential to achieve consistent and effective implementation.

d. The different levels of evaluation and approval ensure authorised and competent persons have thought about foreseeable risks and that such risks are effectively mitigated.

e. It is critical to ensure that the permit is effectively communicated to all persons involved in the task for them to understand the hazards and risk control measures, and how to conduct the work safely.

6.4 Safety Guidelines for Ladders

6.4.1 Selection

a. All ladders must be of sound material, adequate strength and free from patent defect, and must comply with SIRIM Standard. Ladders of inadequate length must not be used.

b. If the ladder is to be used for access it must be of sufficient length to project at least one (1) metre above the level of the landing place or above the highest rung to be reached by the person using the ladder.

c. Metal ladders or wooden ladders, which are wet or have reinforcement running up the sides, must not be used near live electrical equipment or overhead conductors.

d. A foldable step ladder is a self-supporting ladder not adjustable in lenght, having flat straps and a swinging back stay that is held in place by secured locking bar. The maximum height for foldable step ladder is 6.1 metres.

e. A dual-purpose ladder is a step ladder where the back frame is fitted with rungs and can be hinged to provide an extension. When the ladder is in use either as a step ladder or extended, the two sections must be securely latched by a locking bar or solid catch.

6.4.2 Observe the following safety guidelines when using ladders:

a. Do not use ladders that are of poor construction, unsound material or are of inadequate strength.

b. Do not use ladders where a person or ladder may make contact with power lines. Do not use ladders that contain metal near live electrical equipment.

c. Do not set up ladders in passageways, doorways, driveways or other places where a person, vehicle or crane lifted load can hit it

d. Do not use ladders near the edge of an open floor or on scaffolding to gain extra height; if a ladder topples in such a situation, the worker could fall over the edge.

e. Do not work on ladders continuously for extended periods of time (maximum recommended time: 10-15 mins).

f. Do not overreach – ensure that body stays within the stiles and keep both feet on the same rung throughout the task.

g. Do not use the ladder unless slip resistant footwear is being worn.

h. Do not carry materials and tools by hand when ascending or descending the ladder. Persons on ladders should maintain three points of contact at all times (see Fig. 6.1).

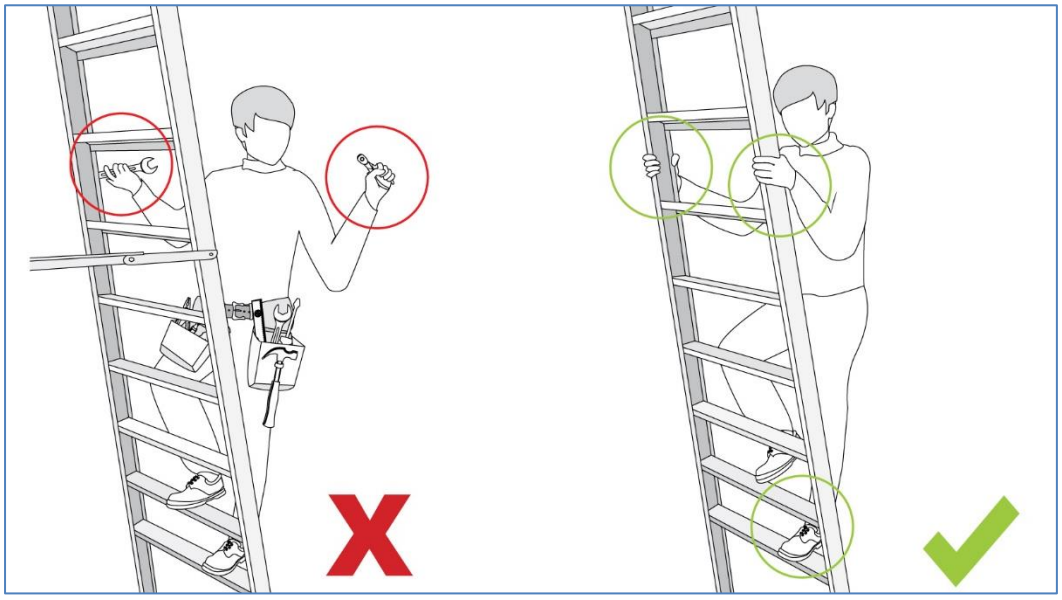

Figure 6.1: Tools and materials should not be carried by hand and should be in a tool belt or side pouch (left). Three points of contact with the ladder should be maintained at all times (right).

i. Do not use ladders with any of the following faults:

i. Metal stiles which are corroded, twisted, bent, kinked, crushed, or with crack welds or damaged feet;
ii. Rungs, steps, treads or top plates which are missing, worn or loose;

iii. Missing, broken or loose tie rods; and
iv. Missing, broken or worn ropes, braces or brackets.

j. Ladders can be checked for serviceability by;

i. Taking each end of the ladder in turn and trying to push the stiles apart and then together. Any movement indicates insecure rungs or loose tie rods;
ii. Laying the ladder flat, raising one end and attempting to push one stile while pulling the other. If the stiles move relative to each other, the rungs are loose; and
iii. Ladders should be inspected routinely to ensure that they are in good condition.

k. Fall prevention measures in association with the use of ladders should be in place if the risk assessment shows that additional protection is necessary (e.g., ladder lashing).

l. Alternative safe means of access and work platform (example of a step platform shown in Fig 6.2) should be provided if the risk assessment shows that usage of ladder may be unsafe for the duration or height of the task.

Figure 6.2: A step platform can provide a more stable work surface.

6.4.3 Step Ladders

a. Step ladders, commonly known as A-frame ladders, in general should not be used for access to another level unless they are designed for the purpose as specified by the manufacturer. Ladders used for access to another level must be properly secured.

b. Step and trestle ladders should only be used when they are in the fully open position.

c. Standing on top of a step ladder (see Fig 6.3, left) is highly unsafe and should never be done. If it is necessary to work from a step ladder, work a few steps below the top rung, so that a handhold can be maintained.

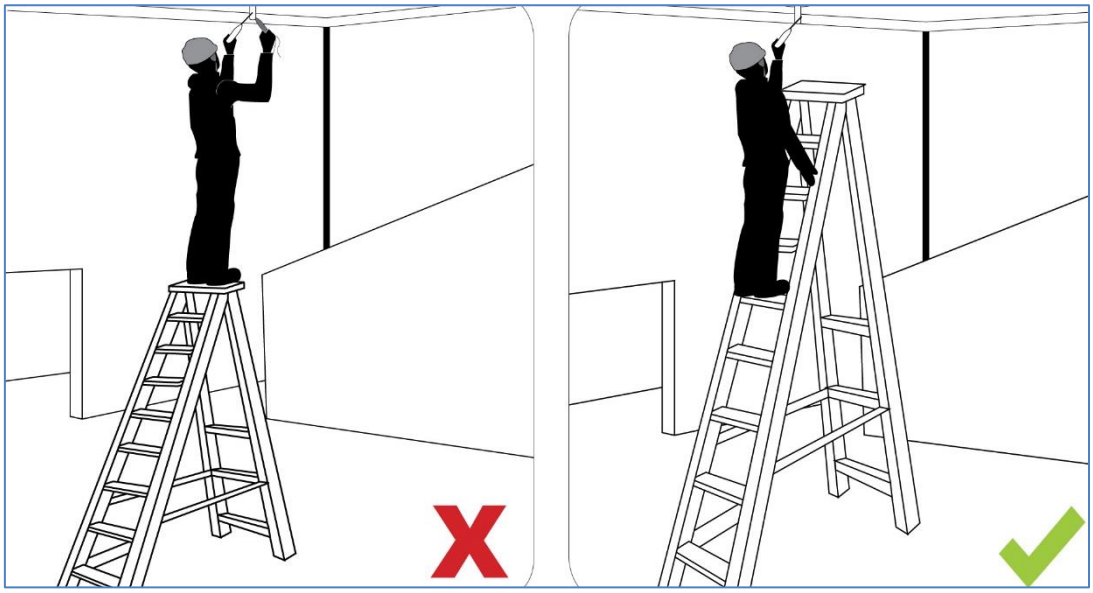

Figure 6.3: If it is necessary to work on a step ladder, work minimum two steps below the top rung, so that a handhold can be maintained.

d. Ensure that both spreaders are locked firmly in the open position.

e. Avoid work that imposes side loading. If side loading cannot be avoided, ladder must be properly secured using tie backs or other suitable means.

6.4.4 Vertical Access Ladders

a. Ladders leaning against a supporting structure should be set up on a level area on firm footing and the base should be located a distance from the wall approximately a quarter of the vertical height of the ladder (see Fig 6.4).

b. Where a ladder is used as a means of access or as a working place, adequate handholds should be provided to a height of at least one meter above the place of landing of the highest rung to be reached by the feet of any person working on the ladder.

c. When securing a ladder:

i. Ensure that the ladder is on firm ground or the user can spread the load, for example, by placing a board at the bottom of the ladder;
ii. Tie the ladder to a suitable point making sure that both stiles are tied (see Fig 6.5).

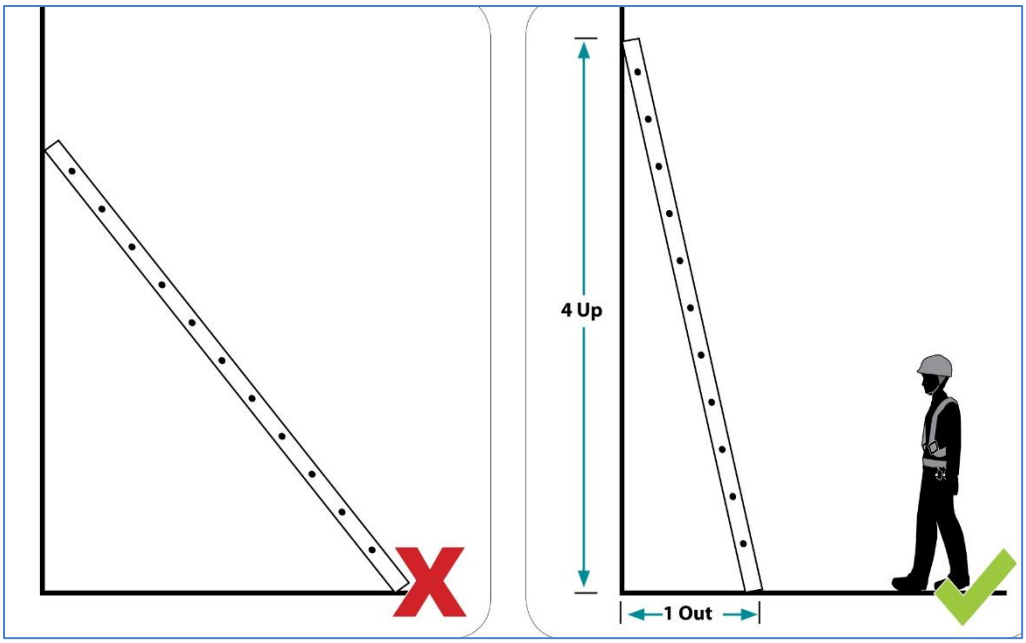

Figure 6.4: The ratio of the height to the base for a correctly positioned ladder is 4:1.

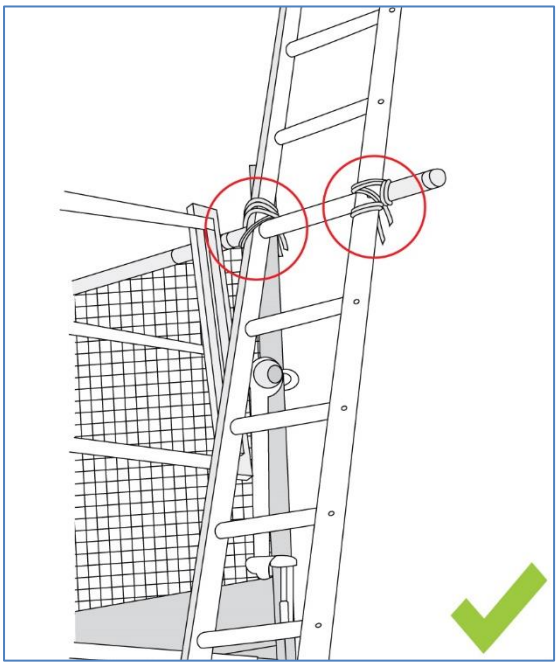

Figure 6.5: An access ladder with secure handhold and both stiles tied.

6.4.5 Fixed Ladders

a. A fixed ladder used to provide access to another level must provide adequate handhold at the landing (e.g., the ladder rising at least 1 metre above the landing).

b. For fixed ladders that rise a vertical distance of more than 3 metres, additional fall prevention measures shall be considered (e.g., installation of a safety cage shown in Fig 6.6).

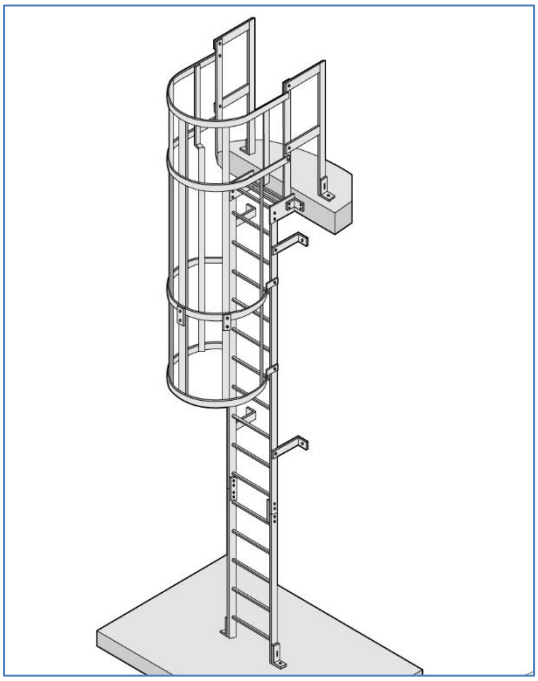

Figure 6.6: A fixed ladder with safety cage installed and a secure handhold at the landing.

c. For fixed ladders that rise a vertical distance of more than 9 metres, an intermediate landing shall be provided to reduce the distance between landings; such landings need to be effectively barricaded to prevent falls.

d. A risk assessment shall be conducted to determine if additional fall prevention measures associated with the use of fixed ladders are required (e.g., installation of a vertical life line).

e. Access to and usage of fixed ladders should be controlled (e.g., locking the base of the safety cage to prevent unauthorised access) such that only persons who are competent and have work duties should access them.

6.5 Scaffolds

6.5.1 Scaffolding, as well as any temporarily erected structures, intended or used as temporary working platform or means of access and egress or storage of materials must be check by competent designated person.

a. Before its first use;
b. After substantial alteration;
c. After any event likely to have affected its stability
d. After every bad weather.
e. Once it has been in place for 7 days.

6.5.2 Each working platform and access platform must have full edge protection comprising handrail, mid-rail, and toe-board or a handrail and infill panel. If the scaffold is incomplete and left unattended, ensure that appropriate controls are put in place to prevent unauthorised access, including the use of danger tags and warning signs.

6.5.3 The scaffold should be stable and if necessary should be secured to the building or structure in enough places to prevent collapse. The scaffold should be checked for clearance from nearby power-lines prior to its erection.

6.5.4 Mobile scaffold wheel locks should be engaged before people work from the scaffold.

6.5.5 Tower Scaffolds

a. Tower scaffolds are particular forms of scaffolding that usually consist of fabricated frame units constructed as single-bay towers. Most available tower systems are aluminium, but steel systems are also available. A tower scaffold that is fitted with castor wheels equipped with effective locking devices is deemed to be a mobile tower scaffold (see Fig. 6.7).

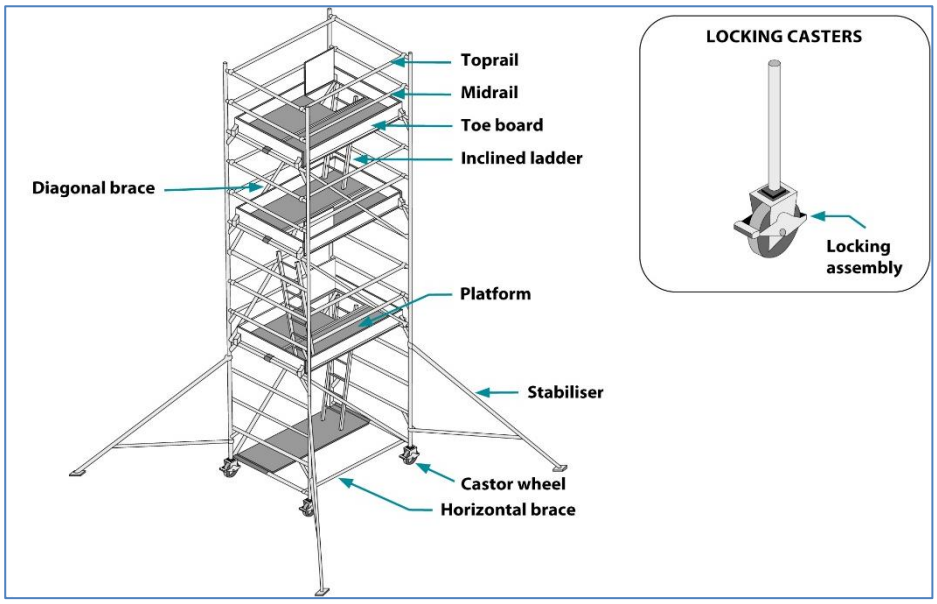

Figure 6.7: A mobile scaffold with access ladder, opening and other features to provide a hazard-free working platform.

b. A tower scaffold should be erected by a scaffold erector. It must be inspected by a scaffold competence inspector.

c. Edge protection such as guard-rails must be provided at the highest landing.

d. When a tower scaffold is mounted on castors for use as a mobile scaffold, the following rules should be strictly observed:

i. Prior to moving, the route must be checked for power lines, overhead obstructions and for holes and uneven surfaces on the ground;
ii. When it is necessary to deploy tower scaffolds on an inclined surface, measures must be taken to ensure stability, such as the use of outriggers. Otherwise, tower scaffolds should not be deployed on an inclined surface;

iii. Never access the scaffold until all its castors are locked to prevent movement;
iv. Never shift or move the scaffold while anyone is on it; and
v. Do not cover the scaffold with containment sheeting such as shade cloth, unless it has been specifically designed for the purpose and it is only used in an enclosed, wind-protected environment.

6.6 Edge Protection, Perimeter Guard-Railing

6.6.1 Edge protection (often referred to as a “guard-rail”) is used to reduce the risk of a person falling from open sides (see Fig 6.8) and through openings.

6.6.2 Edge protection must be provided to the edge of a scaffold, walkway, ramp (see Fig 6.9 and 6.10), and landing or wherever a person is at risk of falling from open sides. The protection must also be able to withstand the impact of a person falling against it.

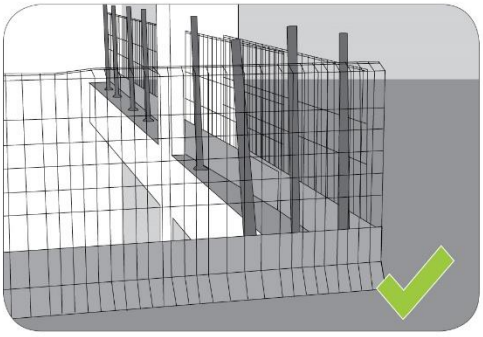

Figure 6.11: Perimeter guard-railing

Figure 6.12: Unprotected stairways pose a falling hazard.

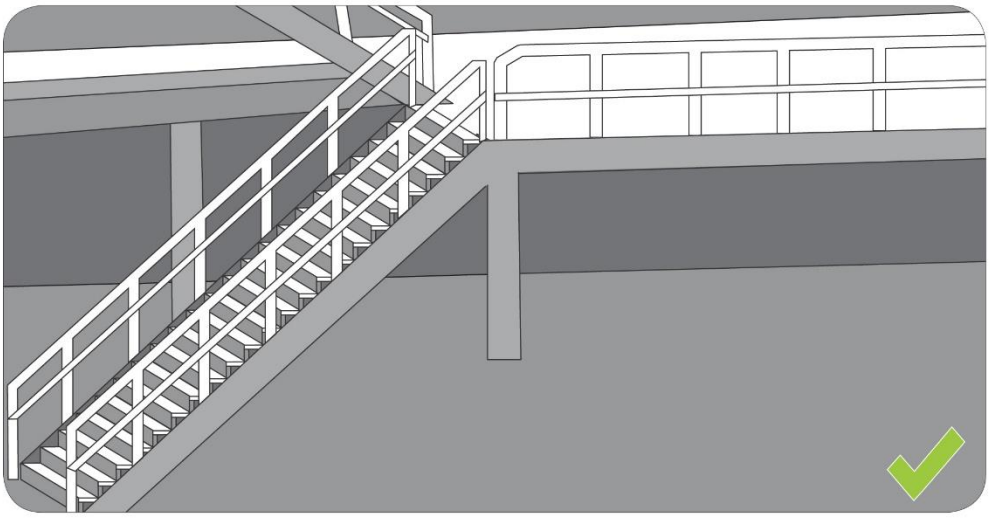

Figure 6.13: Stairways fitted with handrails.

6.6.3 Edge protection must also be provided at any other edge at the workplace where a person could fall. Such protection must adhere to requirements listed below:

a. Temporary or advance guards must be provided to reduce the risk of a scaffold erector falling from the uppermost, unsecured or exposed scaffolding level during the process of erecting or dismantling scaffold;

b. The guard-rail system must be of good construction, in good condition and be able to withstand the weight of a person applied in any direction at any point;

c. If access points are required for equipment (e.g., a hoist), they should be protected adequately with gates, safety chains or any other effective means to prevent a person from falling. The access points must always be covered and secured when not in use (see Fig 6.11 and 6.12);

d. Where guard-rail systems are intended to be used in conjunction with steel structures or tilt-up construction, designers and builders should plan for the guard-rails and fixings to be attached to the panels prior to the structures being raised from the edge protection

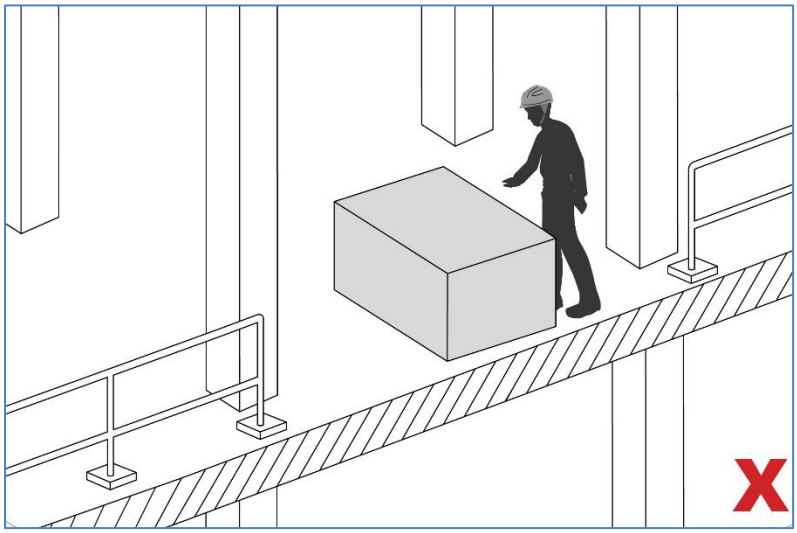

Figure 6.11: Inadequate demarcation and worker protection during temporary removal of edge protection.

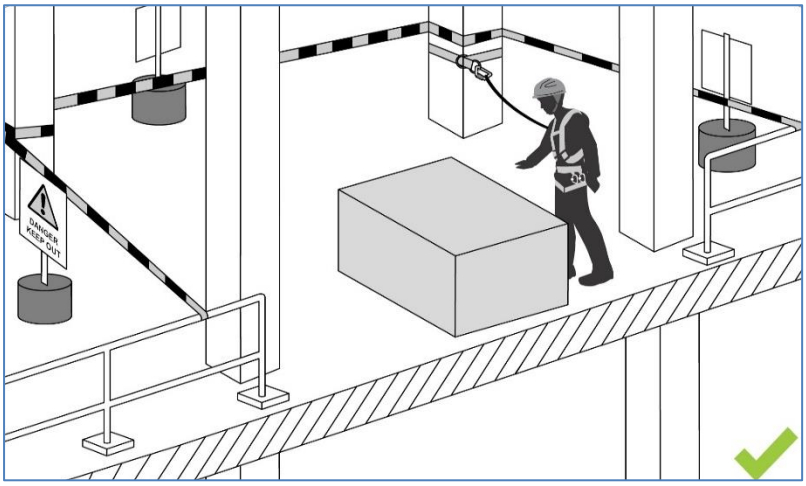

Figure 6.12: Example of proper demarcation and travel restraint for worker during temporary removal of edge protection.

6.7 Travel Restraint Systems

6.7.1 A travel restraint system is a system that:

a. Consists of a full body harness or restraint belt, attached to one or more lanyards, each of which is attached to a static line or anchorage point;

b. Is designed to restrict the travelling range of a person wearing the safety harness or belt so that the person cannot get into a position where the person could fall off an edge of a surface or through a surface.

It is critical to note that travel restraint belts are not designed for fall arrest purposes.

6.7.2 A roof anchor may be used as a travel restraint on steel sheeting or tiled roofs during construction of the roof. It is lightweight, portable and can be installed and removed with minimal time and effort.

6.7.3 Travel restraint systems can be used in conjunction with other fall prevention methods such as guard-rails.

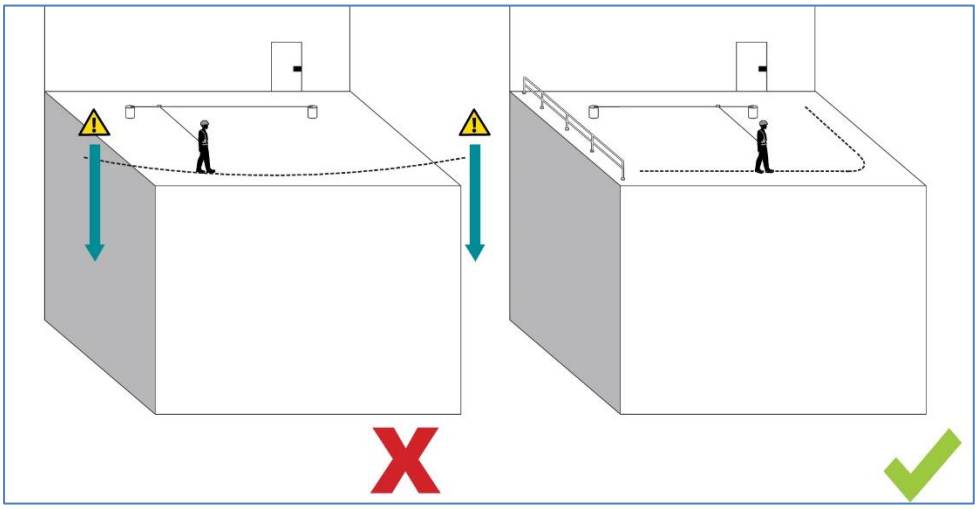

Figure 6.13: Example of incorrect use (left) and correct application (right) of a travel restraint system.

6.7.4 Where it has been planned to use a travel restraint system, the following conditions should be complied before the system is used:

a. The travel restraint system should prevent a person falling from the edge of a roof (see Fig 6.17). The system should not be used on fragile roofs; and persons setting up and/ or using the system should be able to demonstrate that they have a clear and thorough understanding of the system and how the work area can be accessed without the possibility of a fall occurring.

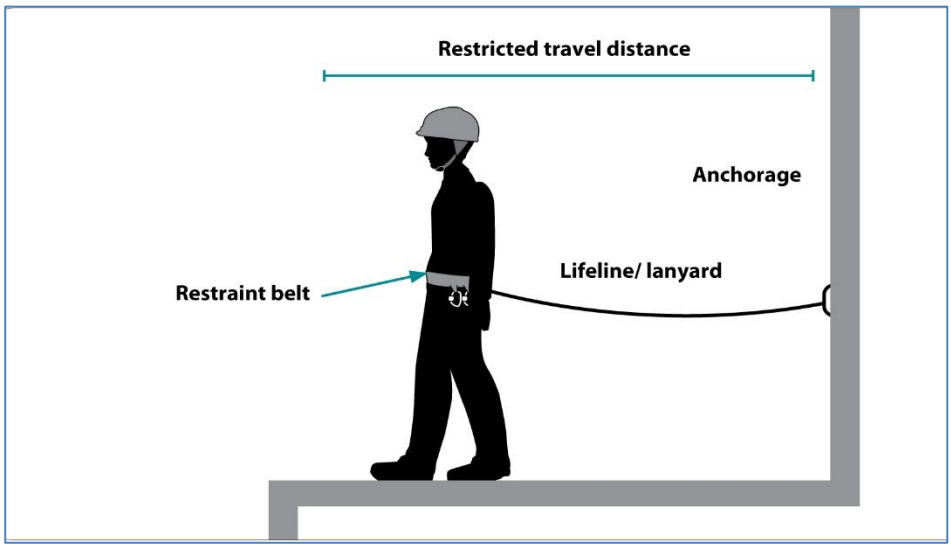

Figure 6.14: The travel restraint system prevents the user from reaching the open side.

6.7.5 Where access to the corner of the roof is required, workers should be attached to two or more sets of ropes and anchorages to prevent a fall from either edge of the roof. While accessing the anchorage points, the users should be restrained so that a fall cannot occur.

6.7.6 The anchorage points must be capable of withstanding at least two times the maximum total load (total weight of person and tools/ equipment) likely to be applied to it without failure. Anchorage points should be designed for additional loading should more than one person be using the system.

6.7.7 If the system consists of ropes that require their effective length to be adjusted to prevent a fall occurring, the method of adjusting the rope length should be by means of a lockable cam device or similar; if there is a possibility of the rope grab (or similar device) coming off the end of the rope, the rope should be suitably terminated.

6.7.8 Restraint belts are used only for travel restraint and not for fall arrest purposes. A personal fall arrest system should be used if the intention is to provide fall arrest instead of travel restraint.

6.7.9 Travel restraint systems are generally only suitable for work such as the following:

a. Roof inspection (not on fragile roofs);
b. Installation and removal of perimeter guard-rail systems;
c. Routine work during temporary removal of guard-rails;
d. Minor repair work, including replacement of some isolated parts of the roof;
e. Painting and cleaning;
f. Installations of skylights and ventilation fixtures;
g. Pointing up tiles or fitting ridge capping on metal roofs; and

h. Installation and removal of television aerials and other similar communication equipment.

6.8 Personal Fall Arrest Systems

6.8.1 A personal fall arrest system is a collection of components that work in conjunction to:

a. Safely stop a person from falling an uncontrolled distance; and
b. Reduce the impact of the fall.

In general, a complete personal fall arrest system consists of three vital components:

a. Anchorages;
b. Body support; and
c. Connections.

It is critical to note that individually, these components will not provide protection from a fall. It is only when they are used correctly and in conjunction with each other that they will be able to arrest or sustain a fall.

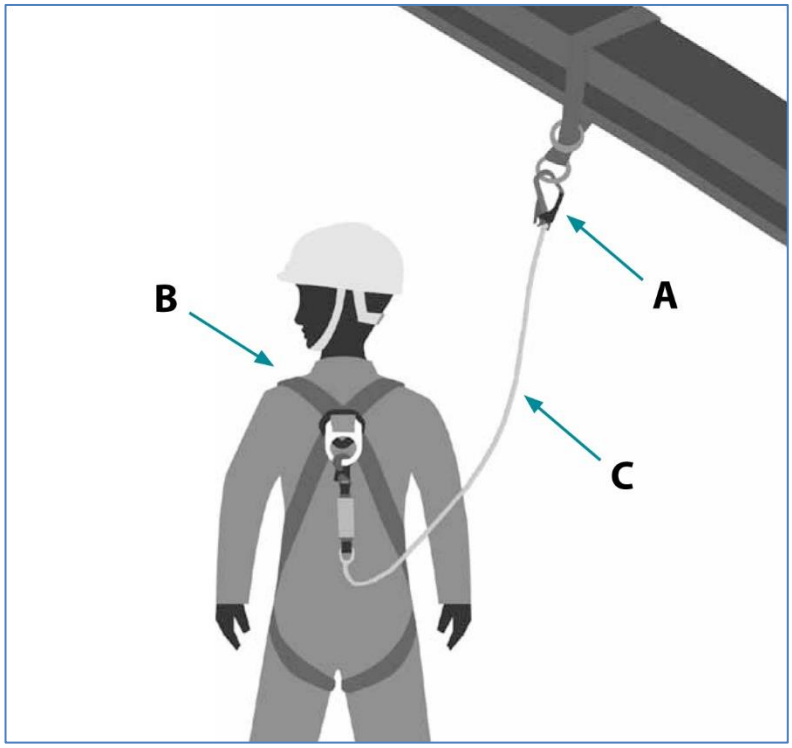

Figure 6.15: "ABC" of a personal fall arrest system – "A": Anchorage, "B": Body Support, "C": Connection.

6.8.2 When used to arrest falls the following guidelines are to be observed:

a. The system should be rigged such that if a fall occurs, the distance fallen will be the shortest. This is to minimise the impact and swing of the arrest;

b. All fall protection equipment should be visually checked prior to usage
c. Once a fall arrest system has been used to arrest a fall, it must be removed from service and not used again; and
d. Anchoring of lanyards to guard-rails of scaffolding should be avoided where possible.

6.8.3 The personal fall arrest system is designed to arrest only one fall. In the event of a fall, even if the shock absorber has not been extended, all the components of the fall arrest system should be inspected and approved by a competent person or the manufacturer before it is put to use again. Otherwise, they are to be removed from service.

6.8.3 Limitations of Fall Arrest Systems

a. Personal fall arrest systems should only be used if it is not reasonably practicable to use other risk control measures to prevent falls. Personal fall arrest systems require a moderate level of skill to use safely, and in the event of an arrested fall, it may cause some physical injury to the user.

b. Height clearance is another limitation of personal fall arrest systems. For a person falling from height, the combined length of the lanyard, sag in life line and the shock absorber fully extended may be more than 5m in total. This 5m might be more than the actual height of the fall;

c. Therefore, when working in areas where falls over short distances are possible, a short lanyard or retractable fall arrest block should be considered.

d. Fall Clearance Distance

i. This is also known as ‘free space’, it is the total distance below a worker who is using a personal fall arrest system to safely arrest his fall without striking an obstruction or the ground. Below are the formulae for two commonly used configurations.

ii. For a harness, lanyard with energy absorber assembly (Fig 6.16):
- Clearance Height = Length of Lanyard + Length of Energy Absorber Extension + Height of Worker + Safety Distance (usually taken as 3ft or 1m)

iii. For a Self Retracting Lifeline (SRL)/Retractable Fall Arresters:
- Clearance Height = Deceleration Distance + Height of Worker + Safety Distance (usually taken as 3ft or 1m)

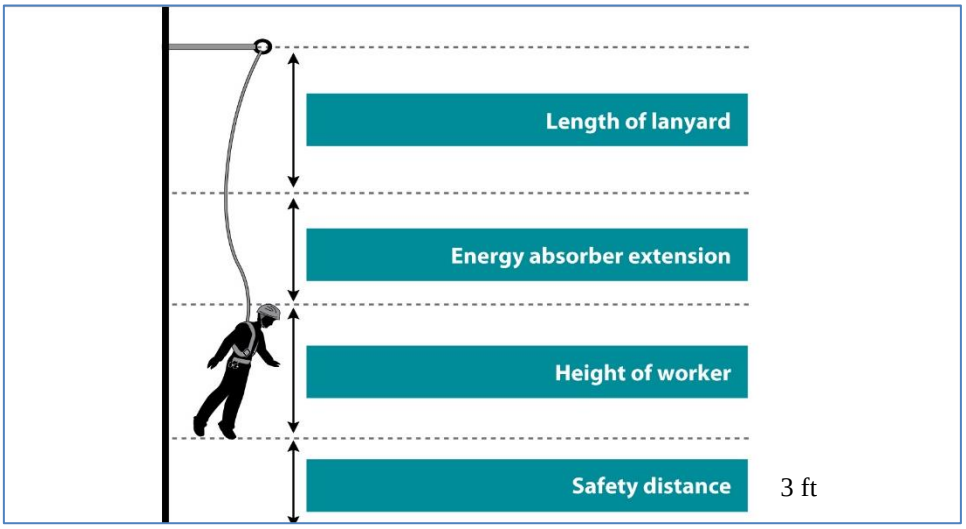

Figure 6.16: A graphical representation of the formula for calculating clearance height.

6.8.5 Hazards of Fall Arrest Systems

a. There are some hazards when using personal fall arrest systems. One such hazard is “swing back” and “swing down”. It is caused by the pendulum effect of a person falling off the edge.

b. “Swing back” – In a fall, particularly from a perpendicular edge, the worker will swing back into the building structure and collide with any obstructions in the path of the swing (see Fig 6.17, left). If there is a risk of a swing back occurring, the use of a personal fall arrest system should be reassessed.

c. “Swing down” – In a swing down, the arrest line extends diagonally from the anchor point, following the perimeter edge of the roof. If the worker falls, the fall arrest line will slide back along the perimeter until it is at a right angle with the edge of the roof. If the arrest line is too long, the worker will drop and hit the ground (see Fig 6.17, right) or the arrest line may break when it comes into contact with the edge of the roof and result in the worker hitting the ground.

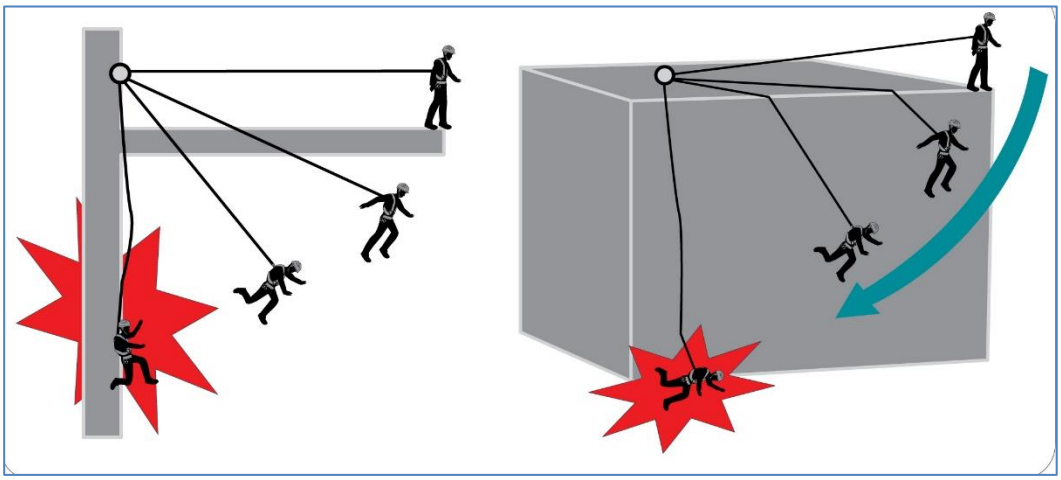

Figure 6.17: Swing back (left) and swing down (right) hazards.

6.8.6 Components of a Personal Fall Arrest System

a. In general, a personal fall arrest system consists of the following components:

   i. Full-body harness;
   ii. Connectors;
   iii. Energy absorbers; and
   iv. Lanyards.

b. They will require connection to a suitable anchor in order to function effectively. The inspection of the components of a personal fall arrest system should be conducted periodically to ensure that they have not exceeded the manufacturer's recommended usage life. Additionally, users should conduct a visual inspection before each use.

c. A full body harness (Fig 6.18) is an assembly of interconnected shoulder and leg straps with or without a body belt or saddle designed to spread the load over the body and to prevent the wearer from falling out of the assembly.

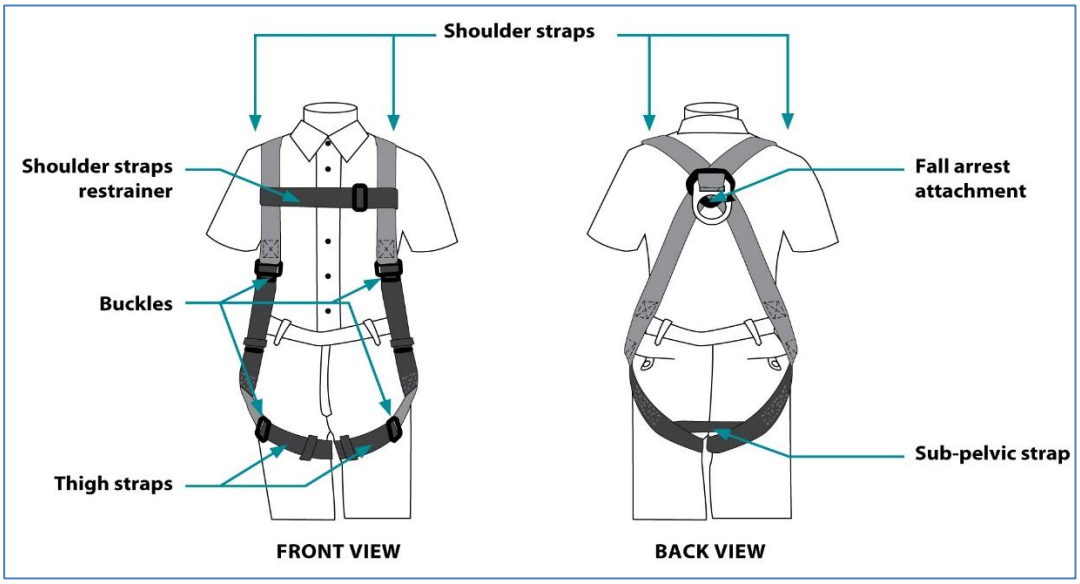

Figure 6.18: Components of a full body harness.

d. Connectors are components that link other components of a personal fall protection system together (e.g., connecting a full body harness to a lanyard, connecting a lanyard to an anchorage). Connectors have a closure function to protect against inadvertent opening (see Fig 6.19).

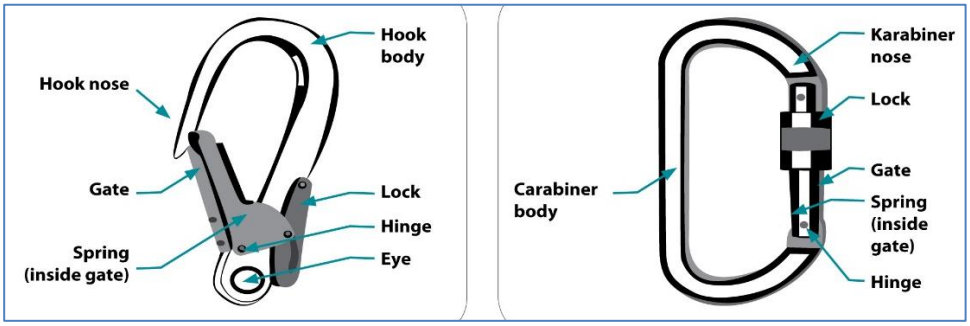

Figure 6.19: A diagram of a self-locking connector or snaphook (left) and a karabiner (right).

e. An energy absorber is a component designed to limit the arresting forces applied to the user in the event of a fall (see Fig 6.20). Energy absorbers shall be fitted correctly as per manufacturers' specifications. Failure to do so may result in the energy absorber not deploying correctly in the event of a fall. The energy absorber may be a separate item or manufactured into the lanyard.

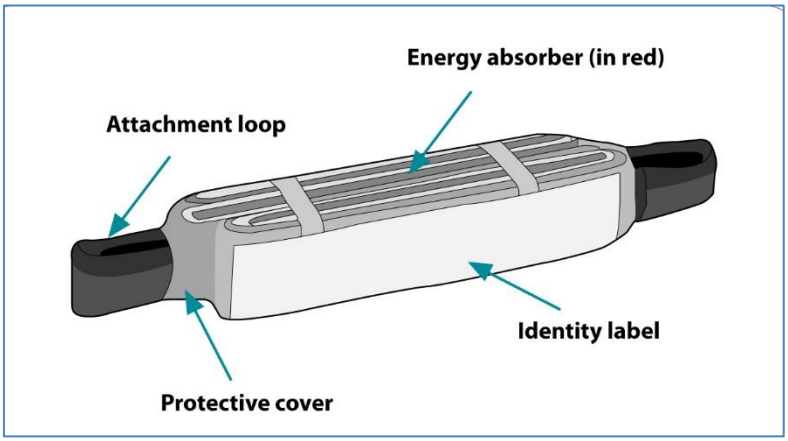

Figure 6.20: Main components of an energy absorber.

f. A lanyard is a finished length of flexible material which is often used in conjunction with an energy absorber (see Fig 6.21). There also exist lanyards with built-in energy absorption capabilities. A lanyard is used to connect a fall arrest harness to an anchorage point or static line. A lanyard assembly should be as short as reasonably practicable.

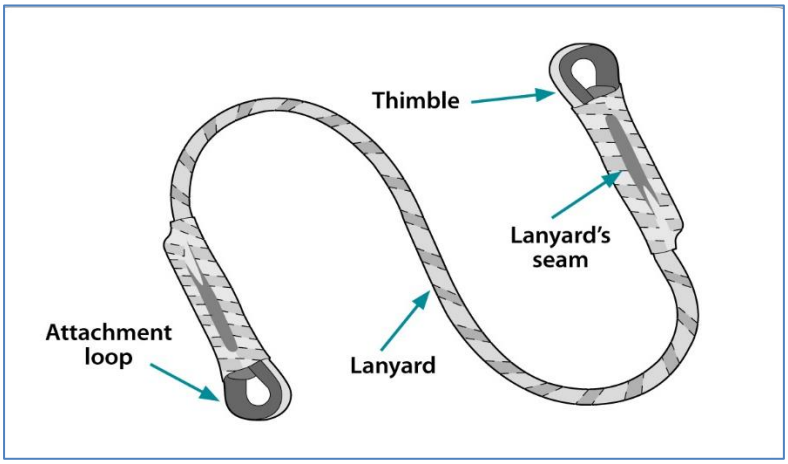

Figure 6.21: Main components of a lanyard.

g. Twin lanyards systems or twin-tailed lanyards allow users to remain protected while transferring from anchorage point to another (see Fig 6.22). This is also known as 100 percent tie off.

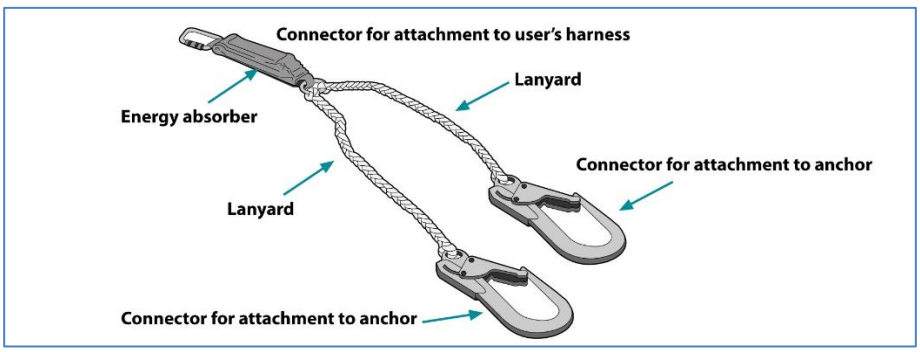

Figure 6.22: Components of a twin lanyard system.

h. A work positioning belt is a form of body support that works in tension or suspension to keep a person at an elevation with both hands free to perform a job (see Fig 6.23). It is critical to note that work positioning belts are not designed to arrest a fall.

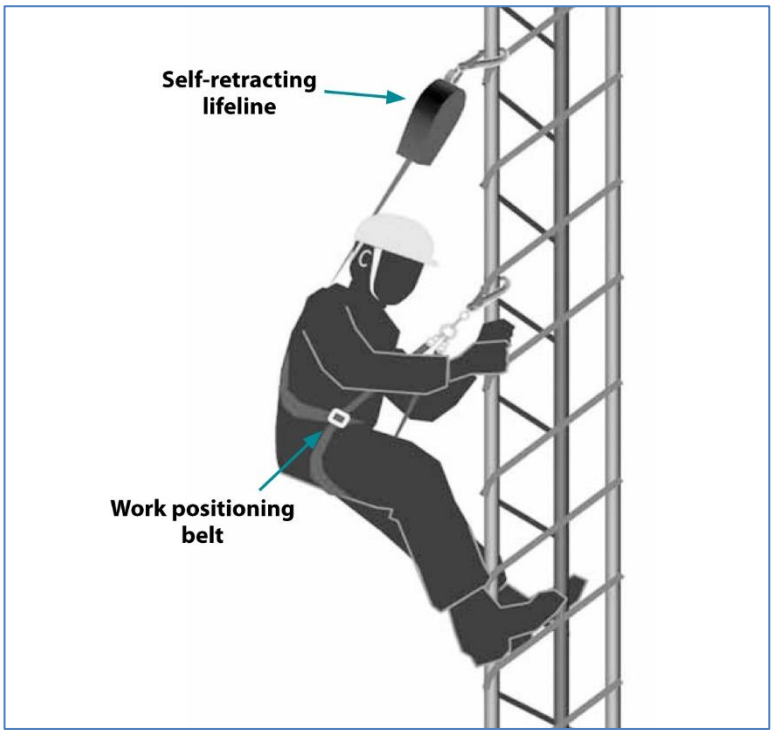

Figure 6.23: An example of a worker using work positioning belt.

6.9 Mobile Elevated Work Platforms

6.9.1 A mobile elevated work platform (MEWP) is a mobile machine consisting of a work platform surrounded by an edge protection system with controls and an extending structure that is intended to position persons, tools and materials at heights. Examples of MEWPs include scissor lifts, boom lifts and vertical personnel platforms (see Fig 6.24).

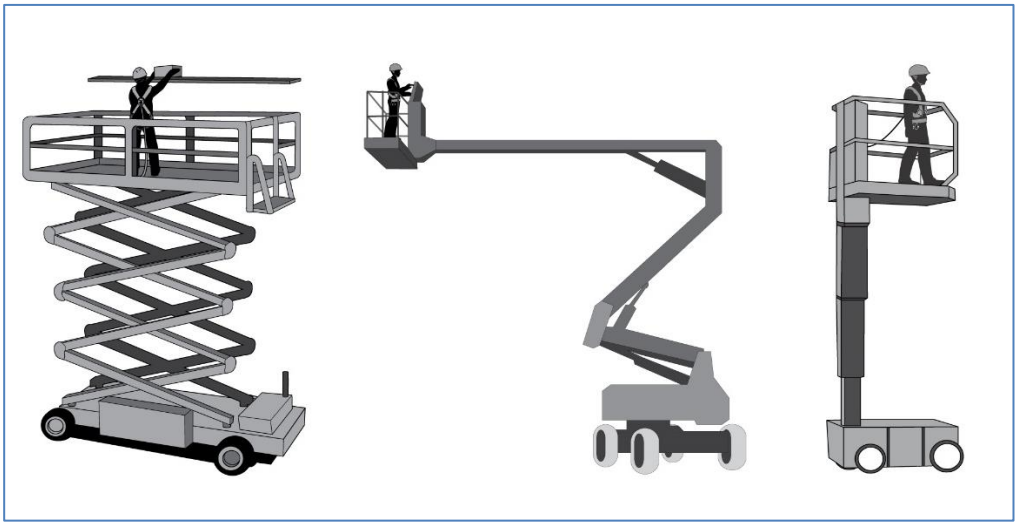

Figure 6.24: Examples of MEWPs; scissor lift (left) boom lift (middle) and vertical personnel platform (right).

6.9.2 Only sky/scissor lift with valid certificate of fitness (COF) namely Pendaftaran Mesin Angkat, PMA shall be permitted to operate.

6.9.3 Only authorized person is allowed to operate this lift

6.9.4 While working at heights in a MEWP, the operator shall ensure that:

i. All persons on the MEWP use appropriate PPE (for work at heights), including a travel restraint system anchored to the manufacturers' designated anchor point inside the MEWP (see Fig 6.25, left);
ii. All persons maintain a firm footing on the MEWP floor – climbing on guard-rails (Fig 6.25, right) or the use of other devices to achieve additional height or reach is prohibited; and
iii. When other moving equipment or vehicles are present, additional precautions (e.g., barricade, traffic management measures) are in place.

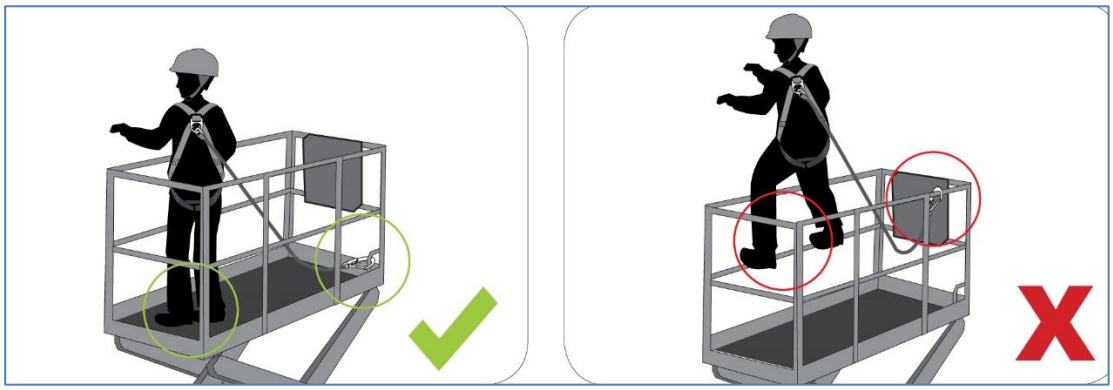

Figure 6.25: Correct method of working in an MEWP (left) and unsafe practices (right).

7.0 APPENDIX

Permit To Work

8.0 RECORD (S)

8.1 Permit To Work