



Fall Protection

WORKSafe® - Designs for Comfort and Protection

WORKSafe® is renowned for its range of high quality personal protective equipment (PPE) designed to protect industry personnel. WORKSafe® is synonymous with Design, Comfort, Protection and Reliability. Continuous research in design and ergonomics, together with the support from competent manufacturing partners and qualified training facilities guarantee that WORKSafe® products are of superior quality for maximum comfort and protection. Apart from strict internal quality control systems, WORKSafe® products are subjected to stringent third-party tests according to international standards such as American ANSI, European EN or Singapore SS standards or others specific to our wide array of PPEs. We relentlessly upgrade and update our capabilities, human assets and R&D in correspondence with workplace safety regulations to deliver high quality, reliable and affordable systems and solutions to our customers.

WORKSafe® FALL PROTECTION SYSTEMS AND SOLUTIONS

WORKSafe® aims to protect your employees working at heights or in confined spaces with WORKSafe® Fall Protection Systems and Solutions. WORKSafe® Fall Protection Systems are developed to exceed industry expectations. Made with the best materials, technology and specialist ISO-certified manufacturing facilities, WORKSafe® wants to deliver maximum protection to your employees. When working at heights, trust that you can always FALL BACK on WORKSafe®!

Relevant Regulations, Standards and Code of Practice

Description	European Standard (EN)	Singapore Standard (SS) / Code of Practice (CP)
Workplace Safety and Health (Work at Heights) Regulations 2014		
Singapore Code of Practice for Working Safely at Heights		CP 2013
Personal Protective Equipment (PPE) against falls from height - Descender Devices	EN341	N.A.
PPE against falls from height - Part 1: Guided type fall arresters including a rigid anchor line	EN353-1	SS528: Part 4
PPE against falls from height - Part 2: Guided type fall arresters including a flexible anchor line	EN353-2	SS528: Part 4
PPE against falls from height - Lanyards	EN354	SS528: Part 2
PPE against falls from height - Energy absorbers	EN355	SS528: Part 2
PPE for work positioning and prevention of falls from height - Belts for work positioning and restraint and work positioning lanyards (Warning! Do not use for fall arrest purposes)	EN358	SS541
PPE against falls from height - Retractable type fall arresters	EN360	SS528: Part 3
PPE against falls from height - Full body harnesses (Letter "A" for Arrest is attached on each harness)	EN361	SS528: Part 1
PPE against falls from height - Connectors	EN362	SS528: Part 5
PPE against falls from height - Fall arrest systems	EN363	SS528: Part 6
PPE against falls from height - Test methods	EN364	N.A.
PPE against falls from height - General requirements for instructions for use and for marking	EN365	N.A.
PPE against falls from height - Anchor devices - Requirements and testing	EN795	SS570
PPE for prevention of falls from height - Sitting harnesses (Warning! Do not use for fall arrest purposes)	EN813	N.A.
PPE against falls from height - List of equivalent terms	EN1868	N.A.



Fall Prevention and Fall Protection Systems¹



1. Fall prevention systems

(a) Individual/Active:

- (i) **Work restraint:** A fall prevention system which relies on a waist-belt or body harness and a fixed-length lanyard connected to a suitable anchor, so as to restrain the person from getting to the place where they could fall.
- (ii) **Work positioning:** A personal fall prevention system which includes a harness connected to a reliable anchor point to support the user in tension or suspension in such a way that a fall is prevented or restricted. All work positioning systems must be provided with a back-up system in case the primary support fails.

(b) Collective/Passive: Guard-rails and other physical barriers with warning signs at the edges of the safe work zone.

2. Fall arrest systems

Individual/Active: A fall protection system that uses a harness connected to a reliable anchor to arrest and restrict the fall and prevent the user from hitting the ground. It usually has an energy absorbing device to limit the impact of gravity forces on the body.

1. Note: Quoted from Singapore Code of Practice (CP) for Working Safely at Height. Users should refer to CP for more details.



Important Fall Protection System Considerations

The following factors are key considerations to provide maximum fall protection safety and to ensure compliance with regulations and standards:

1. **Code of Practice/Regulation/Standards** - Understand Singapore Code of Practice and relevant standards or respective countries' Federal, State, Local and Provincial regulations and standards pertaining to working safely at height or fall protection before selecting and using the equipment.
2. **Warnings** - Always read all instructions and warnings contained on the product, manual and packaging before using any fall protection equipment.
3. **Inspection** - All fall protection equipment must be inspected prior to each use.
4. **Training** - All workers should be trained by a competent person in the proper use of fall protection equipment before using any fall protection equipment.
5. **Rescue Planning** - Minimizing the time between a fall occurrence and medical attention of the worker is vitally important. A thorough rescue program should be established prior to using fall protection equipment.
6. **System Components** - Only components that are fully compatible with one another should be used. Fall arrest systems are designed and tested as complete systems and should be used in this way.
7. **What to Do After a Fall** - After a fall occurs, all components of the fall arrest system should be removed from service.
8. **Product/System Preferences or Information** - If there are any doubts about which fall protection products to use, contact PDS International Pte Ltd or WORKSafe® Distributors for more information.



4 Categories of WORKSafe® Fall Protection

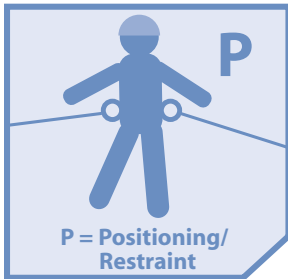


(I) Fall Arrest System

A fall arrest system is required if the risk of falling from an elevated level exists. It is designed to be passive; activated only if a fall occurs. The following components are recommended for a fall arrest system:

- (a) Anchorage Point (EN795) – Eye Bolt/Beam/Cross-Arm Anchorage Strap
- (b) Personal Protection Equipment (EN361) – Full Body Harness
- (c) Connecting Device (EN354, EN355, EN362) – Lanyard, Energy Absorber, Connector

A full body harness distributes the force throughout the body during a fall, reducing the chances of internal injuries. The shock-absorbing lanyard softens the impact on the worker, dramatically decreasing the total fall arresting forces. The third component of the system – the anchorage point – ultimately supports the worker.

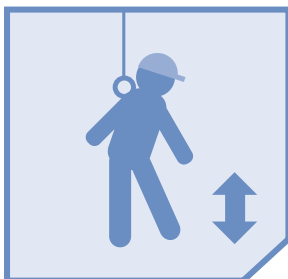


(II) Work Positioning and Restraint System

A personal positioning system allows workers to hold themselves in place, keeping their hands free to accomplish a task. Whenever a worker leans back, the system is activated, making this an “active” system. An effective positioning system would include the following components:

- (a) Anchorage Point (EN795) - Vertical Rods
- (b) Personal Protection Equipment (EN358, EN813) - Work Positioning Belt or Harness with work positioning attachments or Sit Harness with work positioning attachment point
- (c) Connecting Device (EN358, EN362) - Work Positioning Lanyard, Connector

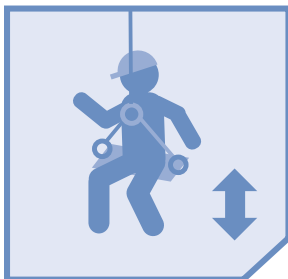
The use of a fall arrest system in conjunction with a personal positioning system is required because a personal positioning system is not specifically designed for fall arrest. By using a combination system, the fall arrest components will be activated should the worker fall.



(III) Retrieval

The third category of fall protection, the personal retrieval system, is mostly used in confined spaces. This system is primarily used where workers enter tanks, manholes etc. and may require retrieval from above if an emergency occurs. A typical personal retrieval system might include these components:

- (a) Anchorage Point (EN795) - Tripod Eye Bolt
- (b) Personal Protection Equipment (EN361) - Full Body Harness
- (c) Connecting Device (EN341, EN360, EN362) - Descender Device, Self Retracting Lifeline with Emergency Retrieval Hoist, Connector



(IV) Suspension

The fourth fall protection category is the personal suspension system. This system is used widely in the window-washing and painting industries and is designed to lower and support a worker whilst allowing a hands-free work environment. The following are typical suspension system components:

- (a) Anchorage Point (EN795) - Anchor Bolt
- (b) Personal Protection Equipment (EN361) - Bos'n Chair/Full Body Harness
- (c) Connecting Device (EN341, EN360, EN362) - Descender Device, Self Retracting Lifeline with Emergency Retrieval Hoist, Connector

Because the components of a suspension system are not designed to arrest a free fall, a back-up fall arrest system should be used in conjunction with the personal suspension system. This fall arrest system will only be activated if the worker experiences a free fall.



THE 4 KEY COMPONENTS OF A PERSONAL FALL ARREST SYSTEM

Anchorage - a fixture or place for the secure attachment of a fall arrest system. A safety harness is able to provide protection from falls only if the harness is attached to a lanyard with shock absorber that is anchored to a secure anchor point or anchor device/ connector.

Anchor Point or Anchorage (Also known as a secure tie-off point e.g. structural beam):

- Must be accessed to be adequate by a competent person
- When accessing existing structural features for use as anchor points, avoid corners or edges that could cut, chafe, or abrade fall protection components.
- Wherever possible, the anchor points should be located above the user, this is to ensure that the anchor line or lanyard is taut or has as little slack as possible reducing the free fall distance.

The following area should never be used as anchor points unless the minimum structural requirements have been determined to be safe and approved by a competent person:

- Standard Guardrails, Balcony Railings
- Ladders/rungs
- Scaffolding
- Light fixtures
- Conduit or plumbing
- Ductwork or Pipe Vents
- Rebar (except for positioning during formwork)
- Roof Stacks, Vents, Fans or Chimney
- TV Antennas
- Any point which does not meet the structural requirements

Anchorage Devices or Connectors (used to join the connecting device to the anchorage point e.g. webbing strap, steel sling, I-beam clamp). There are basically six types of anchor device (as specified in EN795 and SS570:2011). They are tabulated below for reference:

Class	Description
Class A1	These are structural anchors designed to be secured to vertical, horizontal and inclined surfaces, e.g. walls, columns, and lintels, for example eyebolts.
Class A2	These are structural anchors designed to be secured to inclined roofs.
Class B	These are transportable temporary anchor devices, e.g. a tripod over a confined space, or an anchor sling, or I-beam clamp.
Class C	These are anchor devices employing horizontal flexible lines, e.g. extremity structural anchor and/or intermediate structural anchor and/or mobile anchor point and anchor line. The horizontal line is understood to be a line which deviates from the horizontal by not more than 15 degree.
Class D	These are anchor devices employing horizontal rigid anchor rails, e.g. anchor rails, mobile anchor point.
Class E	These are dead weight anchors for use on horizontal surfaces. Note: It is critical to take note that dead weight anchor devices shall not be used where the distance to the edge of the roof is less than 2.5m.



Body Wear

Body Wear (the personal protective equipment worn by the worker such as a full body harness): It provides a connection point on the worker for the personal fall arrest system. Used as part of a system to protect the worker from falling and to limit the extent of potential injury in case of a fall.

- Only form of body wear accepted is the full body harness
- Should be selected based on the work to be conducted and the work environment
- Each anchorage point on the harness should have a static resistance > 15kN for 3 minutes
- Side and front D-rings are for positioning only



Connecting Device

Connecting Devices are critical links which join the body wear to the Anchorage/Anchorage Connectors such as lanyards, energy absorbers, rope grabs, self retractable lifeline used to connect the worker’s full body harness to the Anchor system. It limits the free fall of the worker and arrest a fall.

- Selected based on work to be performed and the work environment
- Potential fall distance must be calculated to determine the type of connecting device to be used

Rescue Device

In the event of a fall, the worker must be rescued as soon as possible so as to prevent further injury. The immediate rescue of fall victims can prevent onset of further injury such as suspension trauma, which can occur when the victim is left suspended in a harness over a period of time. The retrieval of fall victims or self-rescue is an essential component of any fall protection plan.

All the 4 components when used properly and in conjunction with each other, together form a personal fall arrest system that is essential for maximum protection during work at heights.



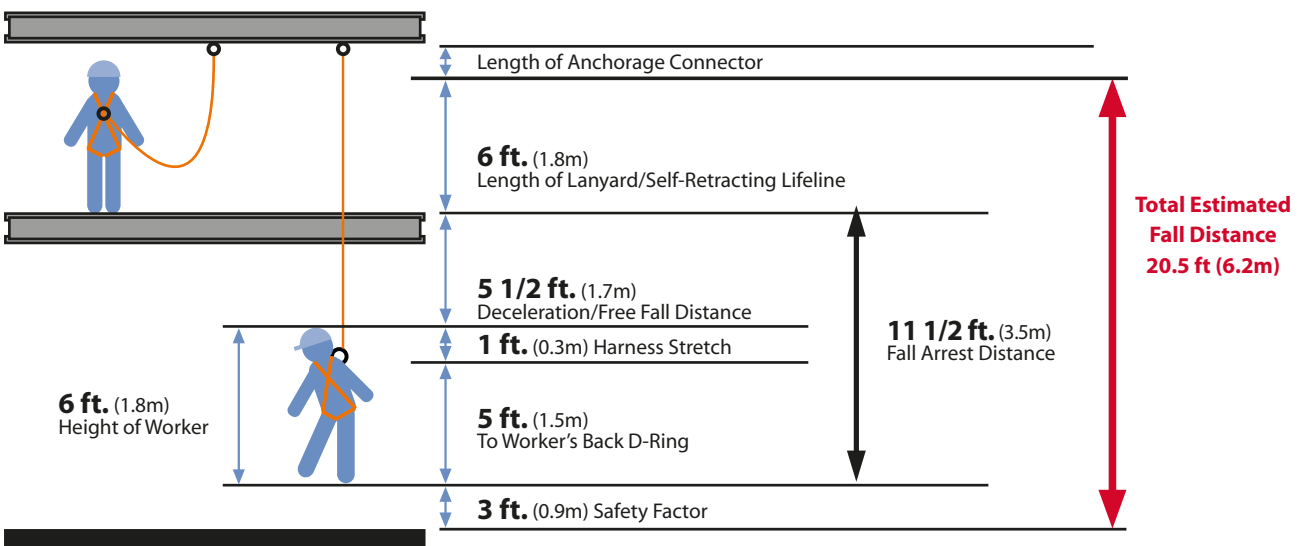
LIMITATION AND HAZARDS OF USING FALL ARREST SYSTEMS

WORKSafe® Fall Arrest Systems should only be used in the event that it is not reasonably practicable to use other risk control measures to prevent falls. Should the user not be trained in the proper usage techniques, he or she may sustain injury during an arrested fall.

Height clearance must be taken into consideration before employing the use of a WORKSafe® Fall Arrest System. The total length of the lanyard, sag in life-line, and the shock-absorbing lanyard may be longer than the height of the fall. For industry professionals working at shorter heights, a short lanyard or a retractable fall arrest block is recommended. However, some hazards might occur during activation of individual fall arrest systems due to a fall. One such occurrence is the swinging motion caused by a pendulum effect of a person falling off the edge.

Calculation of Total Fall Clearance Distance

Before using a shock absorbing lanyard or self-retracting lifeline (SRL), it is crucial to calculate fall distances and select the proper equipment so as to meet estimated fall clearance. Failure to do so may result in serious personal injury, paralysis or death.

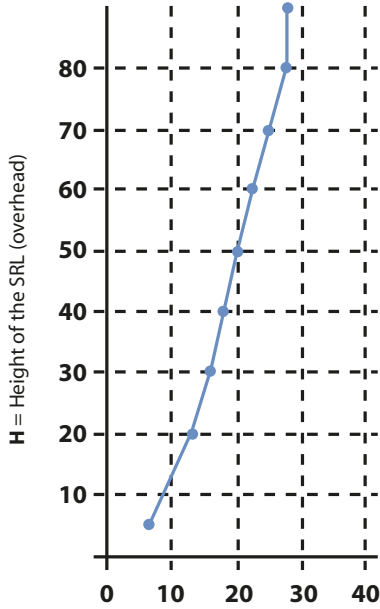


1. When using a 6 ft. (1.8m) shock-absorbing lanyard and a full-body harness, add the length of the shock-absorbing lanyard to the maximum elongation of the shock absorber during deceleration (3.5 ft. or 1.1m) to the height of a worker (average 6 ft. or 1.8m).
2. Then add 3 ft. (1m) as a safety factor.
3. The total 18.5 ft. (5.6m) is the estimated safe fall clearance distance, the height at which you must attach to an anchorage to minimize the risk of contact with a lower level.



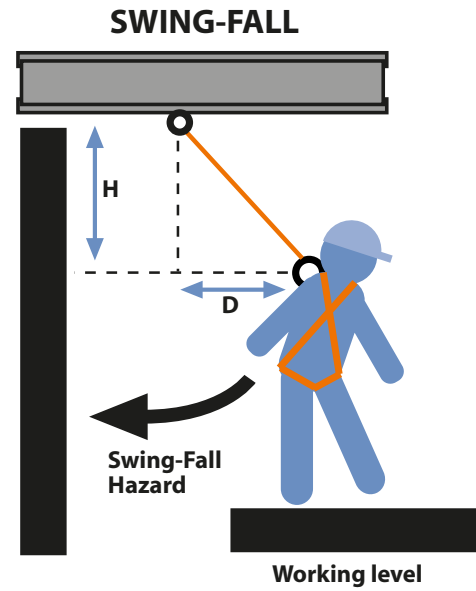
Swing-Fall Hazard

Swing-falls occur when the anchorage point is not directly above the point where a fall occurs. Hence, to minimize swing-falls, user should work directly, if not, as close as possible, below the anchorage point.



D = Distance person can move (horizontally)

Example: If the worker is 40 feet directly below the SRL, the recommended work zone is 18 feet in any direction.





Steps to donning a WORKSafe® harness

1



Hold the harness by the back D-ring. Allow all straps to fall in place.

2




Put on the shoulder straps one at a time and ensure D-ring is located in the middle of the back between the shoulder blades.

3



Connect both thigh straps and adjust as required.

4




Connect chest strap and position at mid-chest region. Adjust as required.

5



Adjust shoulder straps and keep excess strap neat by using the loop keepers.

6



Make last adjustments and check that your harness is fitted properly and not too tight or too loose. You should be able to put your hand between your leg strap and your thigh.



Features of a WORKSafe® Basic Harness



Rear D-Ring

- Basic attachment point for fall arrest
- Suitable for standard site work where worker needs to be attached for safety
- Dorsal Anchorage Point



Polyamide Webbing

- UV-resistant
- Abrasion-resistant



Strap Adjustment Buckles

- Fully adjustable shoulder & leg straps



Front Anchorage Loops

- Karabiner is used to connect the loops
- Used to connect to Fall Arrest Intermediate Attachment
- Used in climbing with rope grabs, confined space, rescue & work positioning situations



Mating Buckles

- Lock & secure the harness in position at the chest & thigh areas



Strap Management

- Hold your straps in place, prevents disorganization