



Fall Protection

Guide to fall protection for workers at height.



About us.

3M Fall Protection, part of the 3M Personal Safety Division offers first-to-market innovations and high-performance solutions that have earned us a reputation as experts in fall protection and rescue.

We continue to invest in technology and products that enhance worker safety, productivity and comfort through our DBI-SALA® and Protecta® brands. We're better equipped than ever to continue investing in technology and products that enhance worker safety, productivity and comfort through our DBI-SALA® and Protecta® brands.

We're elevating safety and comfort to new heights.



Fall Protection



Fall Protection

Safety without compromise for workers at height.

3M™ DBI-SALA® embodies a commitment to excellence and innovation with its extensive range of fall protection solutions, designed to keep you working at height; safely, efficiently, comfortably. The ultimate in fall protection for any work environment.

Trusted, quality.

With over 75 years experience, 3M™ Protecta® provides the complete line of fall protection products you can rely on, at exceptional value.

Guide to fall protection for workers at height.



Whether you're a safety manager who takes great responsibility for the safety of your crew, or an at height-worker who takes an enormous amount of pride in your work, we've got the right gear for you.

We understand that having the right equipment not only makes you productive, but more importantly means at the end of the day you and your team get home safely to your families.

As a well-established and trusted global brands in safety you can be assured that 3M Fall Protection products are rigorously tested and certified.

This guide is designed to provide you with some of the essential information you'll need for safely working at height, from calculating your fall distance through to selecting the right equipment for the job in hand. Use it when evaluating your fall protection requirements, however, always consult your 3M Fall Protection specialist if you're unsure of any aspect of fall protection or the equipment you need.

Whatever the job, we've got your back covered.

With global sales, customer and technical service and training centres, you're never very far from one of expertly trained Fall Protection support team.

☎ To speak to one of our team today, call 00 800 999 55 00.



The mounting and use of the product described within this document assumes that the user has previous experience of this type of product and that it will be assembled by a competent professional according to product documentation. Before any use of this product it is recommended to complete some trials to validate the performance of the product within its expected application.

All information and specification details contained within this document are inherent to this specific 3M product and would not be applied to other products or environment. Any action or usage of this product made in violation of this document is at the risk of the user.

Compliance to the information and specification relative to the product contained within this document does not exempt the user from compliance with additional guidelines (safety rules, procedures). Compliance to operational requirements especially in respect to the environment and usage of tools with this product must be observed. The 3M Group (who cannot verify or control these elements) would not be held responsible for the consequences of any violation of these rules which remain external to its decision and control.

Warranty conditions for products are determined with the sales contract documents and with the mandatory and applicable law, excluding any other warranty or compensation.

Falling statistics.



Year after year, falls from height continue to be the biggest single cause of workplace fatalities and debilitating injuries.

As well as the personal devastating consequences, millions in revenue is lost each year due to falls from height. And in the UK alone it is estimated that in excess of 400,000 working days are lost each year due to such incidents. These figures are reflected across the rest of Europe.

In 2015/16 in the UK alone:

- Falls from height were the most common cause of fatalities, accounting for around a quarter (25%) of fatal injuries to workers
- An estimated 347,800 working days were lost due to non-fatal falls
- 37 fatal injuries to workers involved falls from height
- Typically around 69% of falls are from a height of over 2 metres
- About half (18) of fatal fall injuries to workers were in construction.*

Who's responsible?

Employers and those in control of any work at height activity must make sure work is properly planned, supervised and carried out by competent people. This includes ensuring that the appropriate equipment is available and that it is inspected and safe to use. Employers and those managing work at height activities must identify the potential hazards, evaluate the associated risks and implement the appropriate controls. (see pages 10-11)

Employees have general legal duties to take reasonable care of themselves and others who may be affected by their actions, and to co-operate with their employer to enable their health and safety duties and requirements to be complied with.

*Source: HSE Health and Safety Statistics for 2015/16.

Working at height and how to avoid it.

Working at height means working in any scenario where a person could fall a distance likely to cause personal injury.

For example this could include working on a roof or falling into an opening in a floor or a hole in the ground or working on or adjacent to fragile surfaces.

Before working at height you must work through these simple steps:

- Avoid working at height where it is reasonably practical to do so
- Where work at height cannot be avoided, prevent falls using either an existing place of work that is already safe or establishing controls that prevent a fall
- Where it is not reasonably practicable to prevent a fall from happening - minimise the consequences of a fall by using the right Fall Arrest Equipment.

Other points to consider:

- Always do as much work as possible from the ground
- Ensure workers can get safely to and from where they work at height
- Ensure equipment is suitable, stable and strong enough for the job, as well as maintained and checked regularly
- Make sure you don't overload or overreach when working at height
- Take precautions when working on or near fragile surfaces
- Provide protection from falling objects
- Consider your emergency evacuation and rescue procedures (see page 14).



Working at height.

Key Points for consideration:

- All work at height must be planned and supervised correctly and must be carried out in a safe manner. The work must also be risk assessed (see page 8)
- All work at height must include provision for emergencies and rescue and must not be carried out in weather conditions which could compromise the safety of those working (see page 9)
- All those employed to work at height must be competent to do so; this includes those both working and in supervisory roles. The training must be appropriate to the tasks
- Where work is carried out at height, every employer shall take suitable and sufficient measures to prevent, so far as is reasonably practicable, any person falling a distance liable to cause personal injury.

Identifying hazards and risks.

A Hazard can be defined as a situation which poses a level of threat to life, health, property or environment.

A Risk may be defined as a situation involving exposure to danger, harm or loss when exposed to a hazard.

For example, an unprotected edge is a hazard, but falling from the unprotected edge is the risk.

Risk Assessment

Once the hazards have been identified, a risk assessment must be carried out. This consists of a detailed ‘before and after’ approach focusing on potential hazards and their possible risk to workers, business and the general public. Risk will rarely be eliminated, but can be reduced to an acceptable level by providing protection so far as is ‘Reasonably practicable’.

5 steps to a risk assessment

1. Identify
2. Who & how
3. Evaluate
4. Record
5. Review

Measuring the Risk

A common method of measuring the risk is to rate the likelihood of an incident occurring and the Consequence if it did happen on a scale of 1-5. The outcome is then calculated as Low, Medium or High.

Risk assessment matrix		Likelihood				
		Almost certainly will occur (5)	Good chance could occur (4)	Likely to occur (3)	Unlikely to occur (2)	Extremely unlikely to occur (1)
Most likely consequence	Disastrous (5)	High	High	High	Med	Med
	Critical (4)	High	High	Med	Med	Low
	Serious (3)	High	Med	Low	Low	Very Low
	Significant (2)	Med	Low	Low	Very Low	Very Low
	Minor (1)	Low	Very Low	Very Low	Very Low	Very Low

Once the hazards have been identified and the risks assessed utilising the assessment matrix above, the appropriate control measures can be identified to either eliminate or reduce the risk using the ‘Hierarchy of Control’. (see pages 10-11)

The Risks of Working at Height

A fall could occur:

- From an open, unguarded edge e.g. a rooftop
- From any structure or raised surface, permanent or temporary
- From plant or vehicles
- Through a fragile surface

In addition, we need to consider all existing hazards and how our actions impact on other people who would be affected by our work. This could be from falling items etc.

- All work at height shall be appropriately planned and supervised and undertaken by trained and competent people.
- We need to plan for emergencies and make suitable provision for rescue.
- All work at height must be Risk Assessed.

Before a roof is accessed, it must be assessed for its suitability for access and any fragile roof areas identified. A fall hazard on a roof is generally regarded as being within 2 metres of an unprotected edge or fragile surface. You may come across roofs where the hazard areas are identified by demarcation barriers. These barriers shall not be passed unless further controls are implemented.

Associated Hazards

Other Hazards associated with working at height locations may include:



Falling items



RF non-ionising radiation



Birds-dropping
aggressive behaviour



Machinery - cranes, lift
motors plant rooms



Flues and chimneys-flumes
heat smoke toxins



Asbestos



Air conditioning plant
legionaries disease



Pipework and ducting-
heat chemicals uncontrolled
releases damage



Sharps



Weather conditions -
wind, ice, lightening etc.



Compromised communication



Electrical installations

Hierarchy of controls for working at height.

This Hierarchy of Controls forms the basis of the Work at Height Risk Assessment.

The 'Hierarchy of Control' is a series of control measures that can be implemented in order to eliminate or reduce the risk to an acceptable level.

In order to provide the best fall protection available in a specific work environment, the control measure applicable should be selected in the order from highest to lowest, taking account of the most reasonably practicable solution available.

Avoid - Design or Engineering Solutions

Prevent - Collective Fall Prevention

Prevent - Personal Fall Prevention

Protect/Minimise - Collective Fall Arrest

Protect/Minimise - Personal Fall Protective Equipment

Avoid - Design or Engineering Solutions

The first consideration is can work at height be avoided?

This will usually require engineering or a design solution e.g.

- Can a control unit be positioned at ground level?
- Can the work be brought down to ground level?
- Can equipment be used to undertake the work from the ground?

Engineering out the hazard

As part of the planning process, the first steps to safeguarding workers at height is to try to eliminate the fall hazard altogether. This may be accomplished by a modification of work procedures, or engineering out the hazard in the design and planning stage. A few examples include: relocating a panel box to a more accessible location, using a pole and adaptor to change a light or installing a chain on an overhead valve so that it may be turned while standing on the ground.

Often this process is simpler during initial construction, however, all maintenance workers should think about this when installing any new fixtures within an existing facility. It may be quite easy to initially install a light fixture whilst working from scaffolding, but how easy will it be for the next worker to change the light when the bulb burns out? Whenever possible the job description and area should be modified to eliminate the need to work at height, effectively engineering out the hazard.

Prevent - Collective Fall Prevention

Prevent - Personal Fall Prevention

Fall Prevention incorporates systems and techniques that eliminate the possibility of a fall. Wherever possible, eliminating the risk through the use of these systems, or a change in work procedures is the preferred method of providing fall protection.

- Collective Fall Prevention - Work from an existing safe place of work with fixed permanent guard rails or establish temporary guardrails

Collective Protection Measures must have priority over Personal Protection Measures

- Personal Fall Prevention - Where collective fall prevention controls are not practicable, personal work restraint systems should be considered. (see page 13 for further details).

Protect/Minimise - Collective Fall Arrest

If it is not reasonably practicable to prevent a fall, measures to reduce the consequences of a fall, that is the distance of the fall and the arresting forces, must be established.

Again Collective Fall Prevention measures take precedent e.g. nets and soft landing systems.

The final option is the use of Personal Fall Protective (Fall Arrest) Equipment.

Protect/Minimise - Personal Fall Protective Equipment

As a last resort when there is no alternative means of protection, Personal Fall Protection Equipment (PFPE) should be considered. (see page 13 for further details)

Read on to find out more!

Personal fall protection systems.

Restraint/Positioning/Fall Arrest Equipment is deemed PFPE (Personal Fall Protection Equipment).

PFPE should only be considered when there is no alternative means of protection i.e. the last resort.



Personal fall protection is divided into three categories, which are (in order of increasing risk).



1. Work Restraint

Work restraint systems fall under the title of ‘fall prevention’ and are designed and rigged to eliminate the possibility of workers falling to lower levels. Restraint lanyards must be of a length that when attached to a suitable anchor point, the user cannot go beyond the edge where the potential for a fall exists.

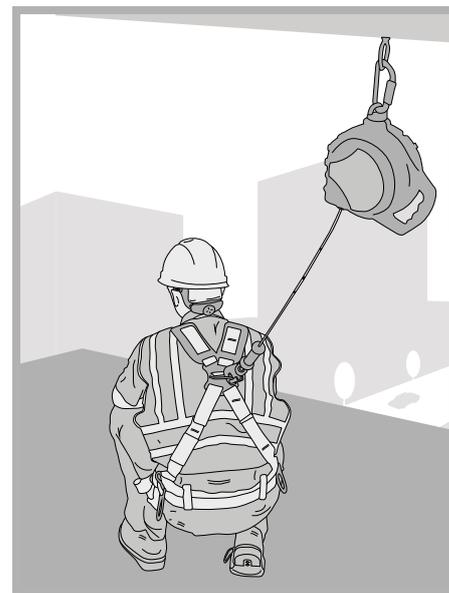
The benefits are obvious, if the possibility of a fall has been eliminated, the potential for serious injury has also been effectively eliminated. Equipment used in restraint systems is generally less sophisticated than that employed in fall arrest systems since the equipment simply needs to hold the worker back and not support them in a fall. It is important to remember to take all related hazards into account when using a fall restraint system.



2. Work Positioning

Also falling under the title of ‘fall prevention’, work positioning activities involve the worker being either fully or partially supported by their equipment.

The work positioning lanyard enables the user to be partially supported on a structure or fixed ladder and use both hands to complete a task, while maintaining stability. This is the workers’ primary means of preventing a fall. The user must ensure that a suitable secondary means of fall protection is used e.g. Fall Arrest Lanyard.



3. Fall Arrest

Whilst Fall Prevention protects the worker by eliminating the risk of falling, it is recognized that it is not always reasonably practicable to achieve this. In such instances, and as a last resort, Personal Fall Arrest Systems are normally implemented. Unlike Fall Prevention, Fall Arrest assumes the inevitability of a fall, and is designed to minimize the consequences of a fall by preventing the worker from hitting the level below and limiting the forces in arresting the faller.

Even with this assumption, it must be stressed that fall arrest systems are not a replacement for care and attention in the workplace.

A common problem experienced during the early stages of a fall arrest programme is the increase in falls due to workers feeling invulnerable and becoming careless.

This can often be dealt with through proper training and diligent communication. 3M Safety Training offer a wide variety of training programmes specifically for workers at height. Visit www.capitalsafety-training.com for further information.

Fall protection and rescue plans.

If you have established that working at height is unavoidable, it is essential to then put into place a written Fall Protection & Rescue Plan.

The objective of having a written Fall Protection Plan is to help prevent falls and the subsequent related injuries by identifying potential hazards and associated risks (see pages 8-9). The plan will detail the working methods, equipment, anchor points and training requirements to allow the work to be undertaken safely.

In addition the plan must include planning for the timely rescue of a fallen worker. A fallen worker left hanging in a harness is at serious risk of suspension intolerance, a condition that is caused by the blood draining from the top half of the body, depriving the brain of oxygen. Just 10 minutes in suspension and the risk of permanent damage increases rapidly. All foreseeable rescue situations need to be considered and planned for.

For more information, see page 44.

Example Plans

Fall Protection & Rescue Plan templates available to download at: www.3M.com/FallProtection



ABCs of fall protection.

A typical Personal Fall Arrest System (PFAS) incorporates key components often described as the ABCs of fall protection.

A

Anchorage

Anchorage is a secure point of attachment.

Anchorage connectors vary by industry, job, type of installation and structure. They must be able to hold fast under the load of a fall, working in suspension or a rescue.



B

Body support

Harnesses distribute fall forces over the upper thighs, pelvis, chest and shoulders.

They provide a connection point on the worker for the personal fall protection system.



C

Connecting devices

Products such as shock absorbing lanyards or self-retracting lifelines connect a worker's harness to the anchorage.

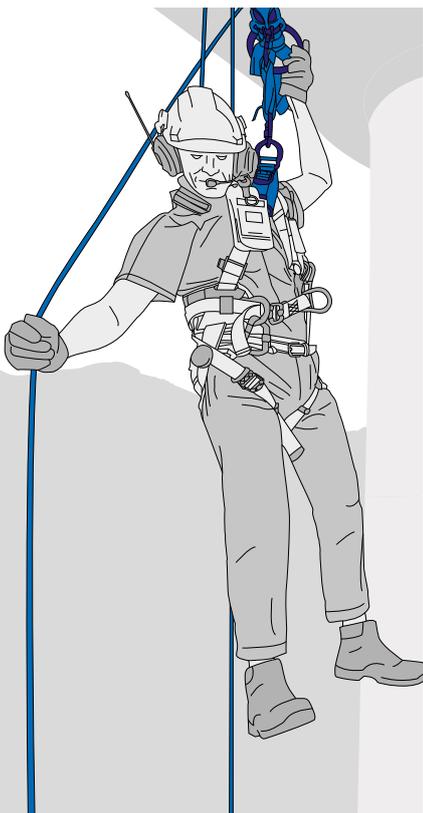


The (A) anchorage/anchorage connector, (B) body support and (C) connecting device - when used together - form a complete system for maximum worker protection. But don't forget the other important components of a comprehensive fall protection programme: (D) descent and rescue, (E) education and (F) fall protection for tools.

D

Descent and rescue

Descent and rescue devices are used to raise or lower a fallen worker to safety, or to retrieve him from a confined space.

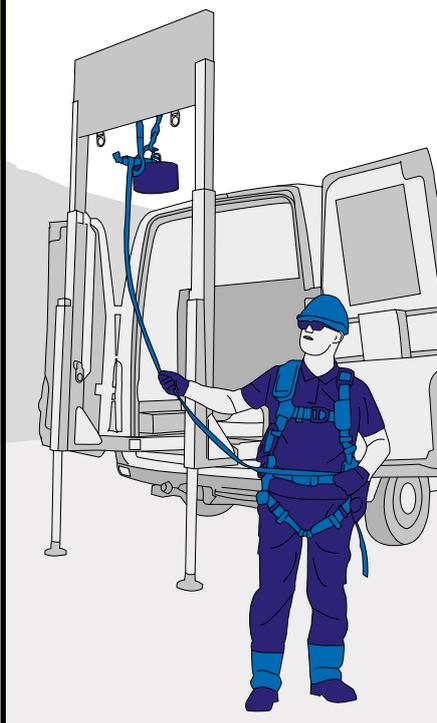


E

Education

We offer a variety of best-in-class certified training courses for work at height and confined spaces at our state-of-the-art training centres located around the world.

We can also bring training to your workforce with our specialised demonstration vehicle providing an excellent introduction to fall protection.



F

Fall protection for tools

Helps make work environments safer and more productive by reducing dropped object incidents.



A Anchorages.

3M Fall Protection offer a wide range of anchors to suit many different work applications and connections such as; general/ all purpose, steel, concrete, roof or aviation.

Anchorage connectors can be fixed or mobile and both permanent or temporary. They all provide a secure point of attachment for a complete personal fall arrest system.

Anchor devices are split into two types:

Temporary Anchorages

- Class B Mobile Anchorages - temporary transportable anchor devices
- Class E Freestanding Counterweight Anchors - used on horizontal surfaces

Permanent

- Class A - Fixed anchorages. Usually secured to vertical, horizontal or inclined surfaces
- Class C - Horizontal Cable Lifelines
- Class D - Horizontal Rigid Rail Systems.





Temporary anchorages.



Single Point Anchors

Portable and permanent anchors for attachment to concrete or metal structures including walls, floors, decks and columns.



Beam Anchors

Beam anchors are lightweight and easily installed. A variety of portable, permanent, mobile and fixed anchors are available for connection to i-Beams and other steel structures.



Slings

Portable anchors used in a variety of applications. Many are 'choker' style, designed to provide a safe and easy way to anchor a fall protection device to an overhead location that is beyond normal reach.



Tripods

Mobile tripods and davit systems can be easily transported and deployed and are usually used for tasks in confined spaces.



Remote Anchoring System

Provides a safe means to anchor a fall protection device to an overhead location beyond normal reach.



Vacuum Anchors

3M™ DBI-SALA® Mobi-Lok™ Self Contained Vacuum Anchor Systems provides an anchor point on virtually any smooth, non-porous surface.

Available in versions for both Aviation and General Industry.



Roof Anchors

A variety of portable and permanent roof anchors for flat or sloped roofs are available. These specialised anchors will keep you safe without causing damage to the structure.

A Anchorages.

Horizontal & Vertical Safety Systems.

Vertical and horizontal fall protection systems allows the worker to move up and down the entire height/length of the lifeline rather than having to disconnect and find new tie-off points along the way. 3M Fall Protection offer a broad range of horizontal and vertical safety systems for mobility and fall protection when working at height. Some important considerations when selecting a system include:

1. Anchorage structure

The structure your system must attach to, such as a steel beam, concrete column or roof, can dictate the type of specialised system required.

2. Portable or permanent

Temporary jobs require lightweight and easy-to-use portable systems that can be moved from one location to another. If a hazardous work area is accessed often, such as a rooftop, a permanent solution may be a better choice.

3. Lifeline type

Synthetic lines are extremely lightweight and compact while galvanised or stainless steel options offer added corrosion and abrasion resistance.

4. Number of users

Always consider the number of workers required to get the job done and choose a system that can accommodate those personnel safely.



Anchorage - permanent horizontal systems.

3M™ DBI-SALA®'s range of permanent engineered horizontal fall protection products has been developed to provide a choice of solutions that allow our customers to most effectively resolve the risks associated with working at height in a wide range of applications and comply with workplace safety regulations.



3M™ DBI-SALA® UniRail™

UniRail is ideal for building projects, in particular for internal and external façade access, inspection and maintenance including walkways and suspended gantries. It is also extensively used for suspended access work by rope access technicians, as it meets the requirements of both abseil and fall protection standards.



3M™ DBI-SALA® Uni 8™ Overhead

The Uni 8 Overhead fall protection system was primarily developed to meet the needs of transport and industrial customers including lorries, trains and aircraft, crane walkways and loading bays. The system has also solved access and safety problems in the entertainment and arena industry. This quality safety solution can support heavy fall arrest and controlled rate descent devices, and ensures free and unhindered movement for the worker when carrying out work at height.



3M™ DBI-SALA® Uni 8™

Uni 8 is best suited to modern building projects and refurbishments but can also be used for industrial safety applications. Minimal moving parts and high grade materials ensure long life expectancy, low cost of ownership and add up to a sound investment. Uni 8 can be fitted to steel beams, concrete and brickwork and is suited for use on older roof constructions in conjunction with fabricated anchor points.



Anchorage - temporary horizontal systems.

There are many instances where a permanent horizontal lifeline to ensure the safety of a user is the best practical option, but the time spent assembling and installing the system make it impractical to do so. What is needed is a quick means of installing the system so work is unaffected.

Suitable for many applications, especially those where work is only required at a point for a limited amount of time, temporary horizontal lifelines are the perfect solution.

Quick and easy assembly and dis-assembly makes it suitable for many types of applications, construction being a major area where the advantages can be utilised. Once the work is done on one area, the line is taken down and set up at the next work point.

Portable or permanent

Temporary jobs require lightweight and easy-to-use portable systems with synthetic lifelines that can be moved from one location to another.



Anchorage - permanent vertical systems.

Permanent Vertical Fall Arrest System

If a structure is accessed often, such as a ladder or tower, a permanent Vertical Fall Arrest System solution, such as 3M™ DBI-SALA® Lad-Saf™, 3M™ Protecta® Cabloc™ or 3M™ DBI-SALA® Railok 90™, is a better choice. Permanent systems require corrosion-resistant galvanised or stainless steel lifelines.

Anchorage - temporary vertical systems.

Temporary Vertical Fall Arrest Systems

This type of solution allows a vertical fall arrest system to be set up as a temporary measure to give protected access to vertical, climbable structures. They offer a versatile solution where existing fall protection does not exist and have the advantage of ease of use and potentially shorter fall clearances over fall arrest lanyards.



B Body support. Fall protection harnesses.

Choosing the right harness.

A harness is the single most important equipment choice you can make!

It is important that the harness selected is fit for purpose for the duties to be undertaken, i.e. a basic harness may meet the requirements for carrying out work in restraint on a rooftop but a belted 4 point, padded harness would be required for tower work. Other considerations would be; the length of time the harness is being worn, the compatibility with your rescue plan and equipment, the working environment and does the work involve working with or near heat sources? In some circumstances harnesses may not be issued to individuals but kept in a store and issued as required. In this case, ease of adjustment may be a consideration.

Whatever the situation it is imperative that harnesses and associated PPE are always inspected in line with the statutory requirements. Regardless of the type of harness selected, if properly adjusted, the full body harness will provide maximum safety and will not interfere with a worker's ability to perform assigned tasks.



Why choose a 3M™ Fall Protection Harness?

Safety harnesses provide comfort and confidence, and directly affect the user's productivity, as well as giving them flexibility to do what needs to be done on the job site. 3M Fall Protection has the latest in full body harness protection.

3M™ DBI-SALA® and Protecta® harnesses—ExoFit NEX™, ExoFit™ XP, ExoFit™, Delta™, PRO™ and FIRST™ from 3M™ have earned a reputation as superior full body harnesses for maximum comfort, freedom of movement and ease-of-use.

We've also launched safety harness innovations such as the spring-loaded, stand-up back D-ring, Delta™ No-Tangle™ pad, locking quick connect buckles and the Revolver™ torso adjusters. While many of our safety harnesses can be used on most jobs, we also manufacture safety harnesses for specific uses within different industries—and you can be rest assured all of our industry-leading harnesses meet all applicable standards and regulations.

Multi-Purpose full body harnesses typically include extra attachment points such as back and side D-rings which allow work in a variety of situations. The belt and pad on our full body harness provide additional back lumbar support, positioning rings and tool carrying options.

Moulded Lanyard Keepers

Breakaway lanyard keepers provide convenient parking for lanyard hooks whilst protecting against parallel shock absorber deployment.

Stand Up Dorsal D-ring

Patented spring-loaded design automatically stands-up, ensuring fast, easy and safe connections to your fall arrest system.

3M™ DBI-SALA® Revolver™ Vertical Torso Adjusters

Simple and fast adjustments that eliminate loose ends and lock into place, preventing slippage.

3M™ DBI-SALA® Duo-Lok™ Quick Connect Buckles

Lightweight one-handed use with memory-fit web-lock ensures fast, non-slipping connections.

Integrated Suspension Relief Straps

Provide an adjustable, continuous loop for post fall, offering suspension relief.



Types of harnesses.

3M™ Fall Protection harnesses are available in different types, with various features, depending on their intended use.



Multi-purpose harness

This type typically includes multiple attachment points for fall arrest, (front and back) which allow work in a variety of situations.



Work positioning harness

Includes work positioning D-rings on the hips and integral waist pads for additional back lumbar support. For use with pole straps or work positioning lanyards allowing hands-free operation.



Confined entry/ retrieval harness

Either attachment point located on each shoulder can be used with a specific lanyard or lifting strap for upright retrieval from confined spaces.



Suspension harness

Typically have low frontal attachment points for use with descent control devices and rope access equipment.

Fall protection harness fitting instructions.

Before starting.

Remove all items from your pockets, as during work, or most importantly in the event of a fall objects in pockets can become trapped between the harness webbing and the wearers body, potentially causing injury. Always refer to instruction for use supplied with the specific harness, concerning correct fitting and adjusting.



Step 4. Chest straps.

Attach the chest strap buckle to the corresponding opposite side buckle (see buckle types).



Step 1. Getting started.

Hold harness by back D-Ring, which is often held in place by a D-Ring pad, make certain straps are not twisted.



Step 5. Waist Belt (if present).

Attach the Waist strap buckle to the corresponding opposite side buckle (see buckle types).



Step 2. Shoulder straps.

Slip harness over arms and onto shoulders. Make certain all straps are not tangled and hang freely.



Step 6. Adjust harness to a snug fit.

Adjust shoulder straps to a snug fit with the Vertical Torso Adjusters (on applicable models). The left and right sides of shoulder straps should be adjusted to the same length and the chest strap should be centred on your lower chest, approx. 15 cm down from shoulder. The front D-ring on the vest style harness is moved up or down by adjusting the shoulder straps and leg straps.

Centre the back D-ring between your shoulder blades. Note: On applicable models, the back (dorsal) D-Ring can be repositioned up or down on the harness webbing as needed for a correct fit. Re-adjust leg straps to a snug fit. At least 8 cm of webbing must extend past the buckle on the leg straps. Adjust the waist belt (if present).

Step 3. Leg straps.

Reach between your legs and grasp the leg strap on your left side. Bring the strap up between your legs and connect it with the buckle on the left side. Connect the right leg strap using the same procedure (see correct leg adjustment).



You're ready to go!

A properly donned and adjusted full body harness will effectively distribute impact forces throughout your body and provide appropriate support during suspension and rescue following a fall.

Turn to the next page...

Find out how to adjust your harness and what types of buckles are available.



Fall protection harness adjustment instructions.

Correct leg adjustment

If you cannot pass your hand under leg strap - Too small.



If you can just pass your hand under leg strap - Correct.



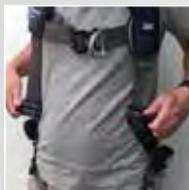
If you can pass your fist under leg strap - Too large.



Torso adjusters type

Revolver

To tighten:
Turn Ratchet Knob in direction A.



To loosen:
Pull Ratchet Knob out and turn in direction B.



Spring loaded

To tighten:
Hold the buckle at 90° to the webbing and pull free webbing.



To loosen:
Hold the buckle at 90° to the fixed webbing and pull the buckle.



NOTE: After adjustment, tug upwards on the shoulder straps to ensure that each adjuster is locked in place.

Types of buckles

QC Quick connect buckles

To attach:
Insert male portion into receptor until click is heard.



To tighten:
Hold the buckle at 90° to the webbing and pull free webbing.



To release:
Press the tabs on the buckle towards each other with one hand, while pulling on the tab portion of the buckle with the other hand.



To loosen:
Hold the buckle at 90° to the webbing and pull the buckle.



A plastic end keeper on the end of the strap will stop it from pulling completely out of the buckle.

PT Pass-Through Buckle

To attach:
Pass male buckle through female buckle.



To tighten:
Hold the buckle at 90° to the webbing and pull free webbing.



To release:
Pass male buckle through female buckle.



To loosen:
Hold the buckle at 90° to the fixed webbing and pull the buckle.



A plastic end keeper on the end of the strap will stop it from pulling completely out of the buckle.

TG Tongue Buckle

To attach:
Pass webbing through buckle, and adjust to fit then put tongue through grommet. Secure web through keeper.



To release:
Pull on free end of webbing, then remove tongue from grommet, feed webbing out of buckle.





C Connecting devices.

Products such as shock absorbing lanyards or self-retracting lifelines connect a worker's harness to the anchorage.

Lanyards

Lanyards are used as a means of connection between the anchorage and the harness worn by the worker. They must include an energy absorber to limit the impact forces to the body in the event of a fall to a maximum of 6 kN. The maximum length of an EN 355 compliant lanyard is 2 m.

Self-retracting lifelines (SRLs)

Commonly referred to as Self-retracting lifelines (SRLs) this method of fall arrest has some advantages over conventional lanyards in that as there is no 'slack' line and the fall distance can be greatly reduced. They also offer greater flexibility of movement in many situations.

Choosing the right lanyard.

Lanyards are split into 3 distinct types, each with a specific purpose: shock absorbing lanyards (with absorber), restraint lanyards (no absorber), and work positioning lanyards.

Shock Absorbing Lanyards

These lanyards are for use in situations where a user is exposed to a potential risk of fall. Whether they are made of rope or of webbing, whether they are adjustable or not, shock absorbing lanyards incorporate a shock absorbing system to ensure forces are limited in a fall to under 6 kN.



Restraint Lanyards

A connecting lanyard must only be used for restraining purposes. In no case should the user be able to manoeuvre in an area where there is a risk of falling. The restraint system is precisely defined for each place where it will be used.



Work Positioning Lanyards

A work positioning lanyard when used in conjunction with a belt/harness with a belt allows the user to work in comfort, whilst keeping both hands free. Normally a work positioning system would be used in conjunction with a fall arrest system.



Considerations when choosing your lanyard.

Shock Absorber

Lanyards designed for use as part of a personal fall arrest system must contain an energy absorbing unit that will limit the force on the worker to below 6 kN with up to a 4 m free fall. Most manufacturers now keep the arresting forces below 4 kN.

Webbing

Webbing is an important factor in the durability and safety of the lanyard. You want to ensure that the webbing is strong enough to endure rough use and exposure to sunlight and other elements without tearing or fraying. Nomex[®]/Kevlar[®] webbing is used for specialty applications such as welding that require fire resistance or when extra protection is need against arc flash hazards. Webbing may also be coated with polyurethane to provide protection against grease, oil, dirt and grime.

Connector/Hook

Most lanyards are available with traditional auto-locking snap hooks. Lanyards can also be fitted with larger snap hooks or carabiners for connection to larger anchorages.

Cable

Some lanyards are made of vinyl-covered cable for extra durability or when working in high heat environments.

Length

Maximum lanyard length is 2m. A lanyard should be long enough to be user friendly, but kept as short as possible to minimize the free fall distance. Knots should never be tied in lanyards to reduce their length as this can reduce the strength by 50%.

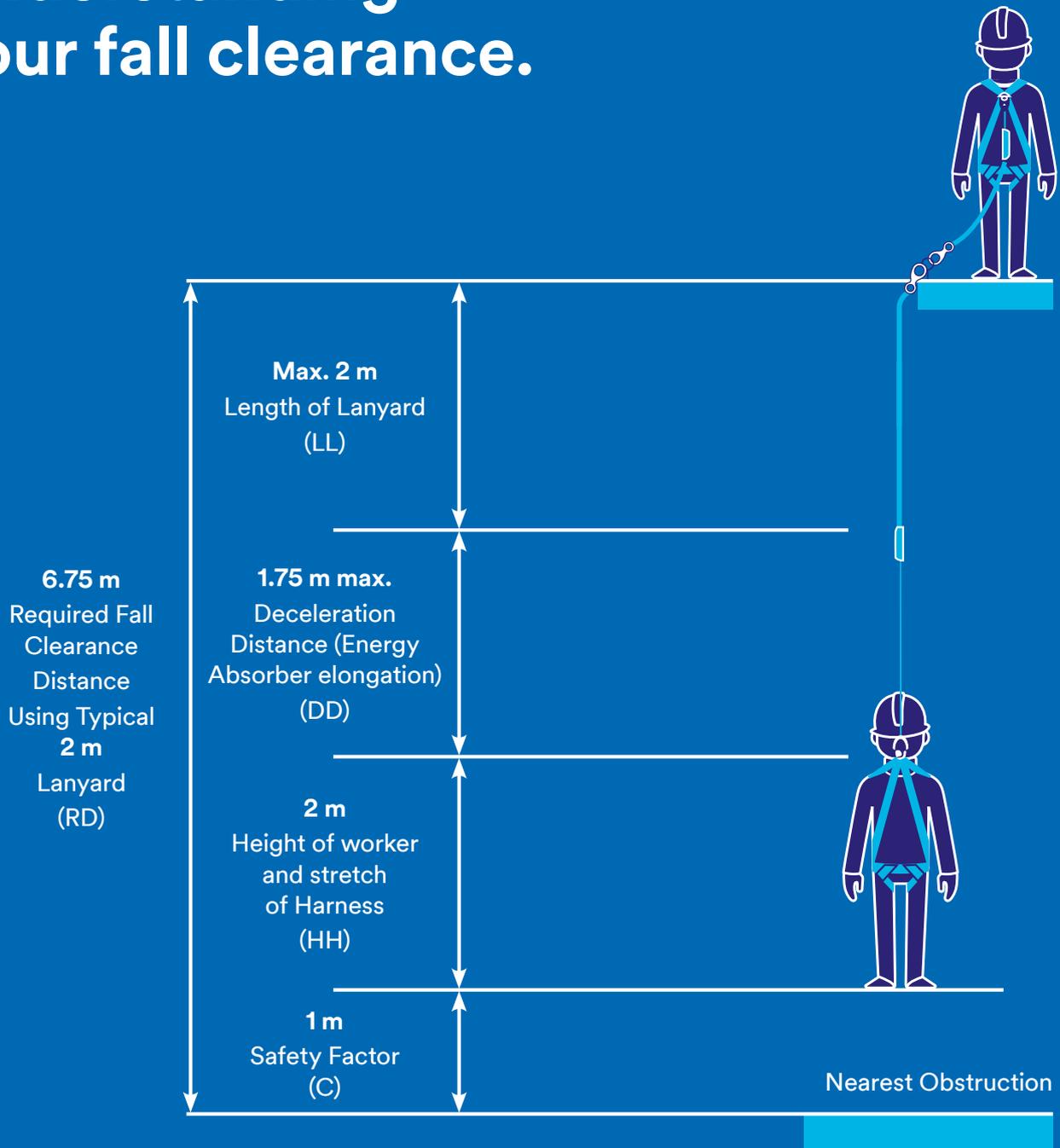
Fall/Impact Indicator

If the lanyard has been used to arrest a fall or if the energy absorber has been deployed, the lanyard must be retired immediately. An impact indicator gives easy visual reference of a deployed shock absorber.

Tie-backs

Some lanyards have additional connection point(s) allowing them to be passed around large anchor points, connecting back onto themselves, and may also be adjustable.

Understanding your fall clearance.



LL = Lanyard Length (max. 2 m)

DD = Shock Absorber Deployment Length (1.75 m max.)

HH = Worker Displacement and Harness Extension = 2 m

This example of fall clearance requirements is of a CE Energy Absorbing Lanyard complying to EN355 standard.

Whenever possible, when attaching a fall arrest lanyard, choose an anchorage point located ABOVE the position of the user.

C = Safety Factor and Clearance under worker = 1 m

RD = Minimum free distance below feet of the user to Nearest Obstruction = LL + DD + HH + C

NOTE:

This information is provided as a general explanation. In use the specific manufactures product instructions must be read, understood and followed.



C Connecting devices.

Self-retracting lifelines (SRLs).

Self-retracting lifelines offer longer lengths than lanyards, allowing the worker greater freedom of movement whilst providing fall protection. The SRL (connected to an anchorage point) automatically locks when weight is suddenly applied to it.

SRLs are available in many different lengths and cable or web options depending on the application.



Self-retracting lifelines (SRLs).

Commonly referred to as SRLs this method of fall arrest has some advantages over conventional lanyards in that as there is no 'slack' line, the fall distance can be greatly reduced. They also offer greater flexibility of movement in many situations.

Key features

- In the event of a fall an SRL will minimise free fall distance
- Available in various working lengths
- The line can be steel, fibre or webbing
- Offer limited freedom of movement whilst maintaining continuous attachment
- In the event of a fall, the reel will lock at a pre-determined speed

Limitations

- Direct attachment to anchor point and the attachment point of the harness
- Attachment wire must not deviate by more than a specified angle from the vertical (e.g. 30 degrees)
- The wire must not run over an edge. (There are some leading-edge SRL's e.g. 3M™ Protecta® Rebel™ Self-retracting lifeline that can be used horizontally with a special extension sling.)
- User must remain below the SRL attachment point



Understanding fall clearance. Self-retracting lifelines.

Fall clearance is the vertical distance needed to safely arrest a fall so that the worker does not hit the ground, or obstacles below.

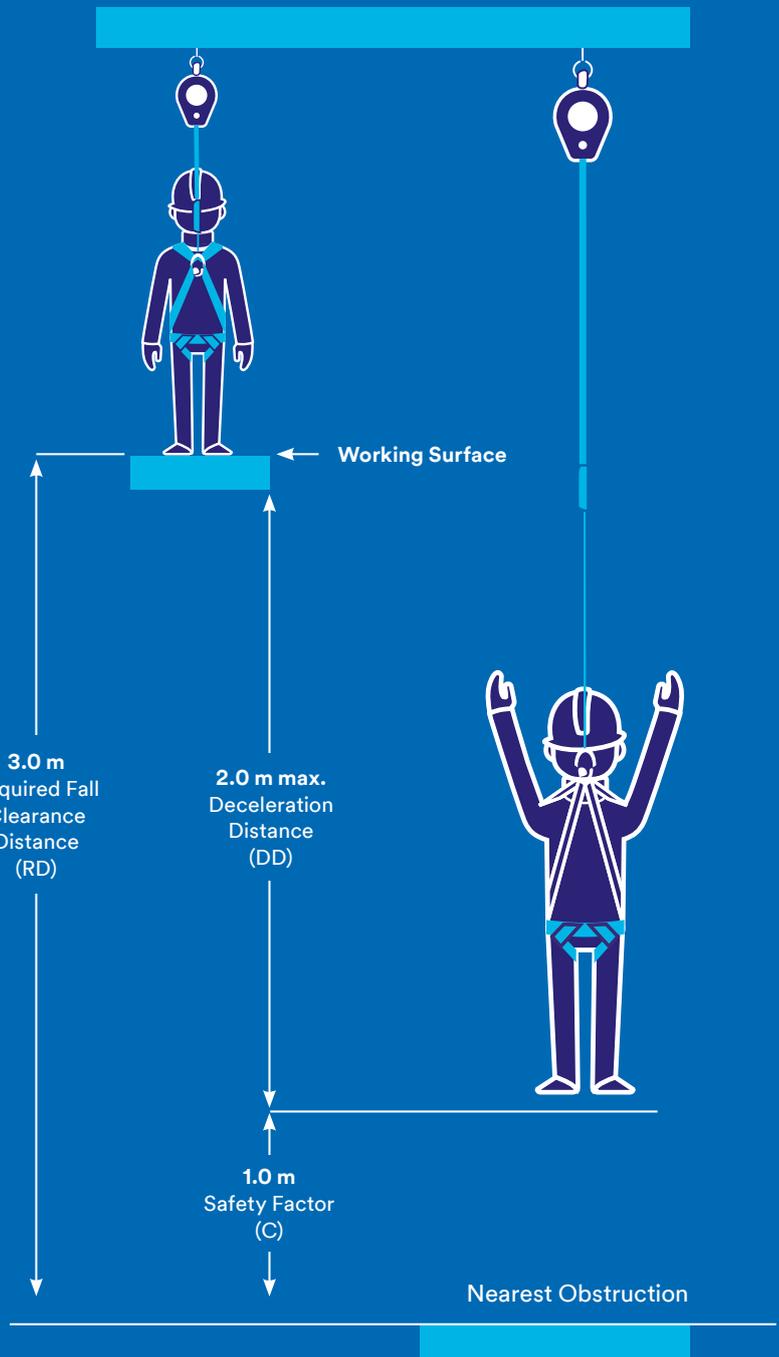
To understand the required Fall Clearance add the appropriate factors together, this will give you the safe Required Distance (RD) below the working surface for work which is to be carried out where there is any risk of falling. Always check product instruction for this value as it can differ from one product to another.

DD = Free Fall, Lock Off and Deceleration (2.0 m Max. EN360)

C = Clearance to Obstruction During Fall Arrest (1.0 m minimum safety factor required, EN360)

RD = Required Distance Below Working Surface to Nearest Obstruction

$$\frac{DD + C}{RD}$$



This example of maximum fall clearance requirements is of a CE retractable type fall arrester complying to EN360 standard. Always refer to individual products Instructions for use for specific fall clearance requirements.

Swing fall hazards.

Swing fall can occur when using a shock absorbing lanyard or self-retracting lifeline (SRL) whilst working at height.

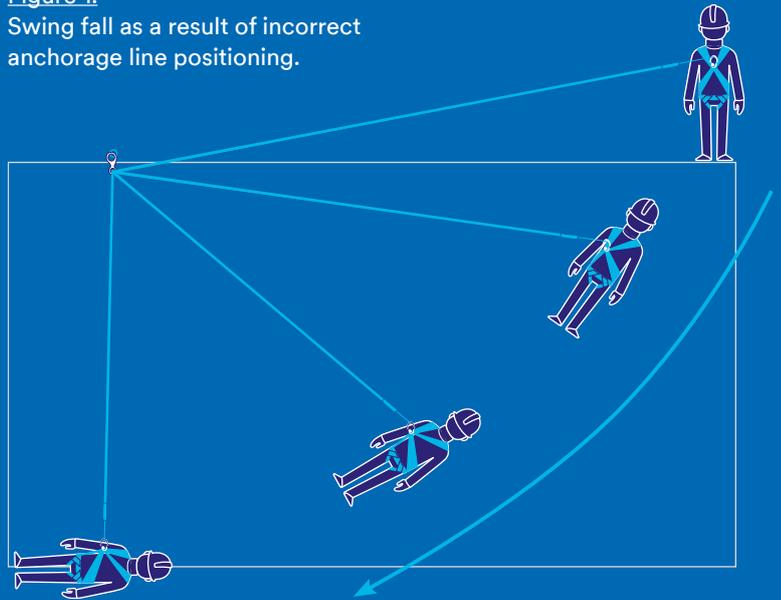
A swing fall is a pendulum-like motion that can occur when the operator falls and their connector device is in a position located horizontally away from the anchorage point. This is most likely to occur when connected to an anchorage point that is not positioned directly overhead.

Precautions to avoid this hazard include removing working slack from the rope working line, using restraint techniques and ensuring the person does not approach a leading edge such that they may be subjected to an unplanned fall.

Operators should ensure they do not subject themselves to swing fall by taking measures to avoid the risk. Refer to Figure 1 and 2 for examples of swing fall hazards. Fig 1 illustrates how swing fall can increase fall height and cause impact with lower surface.

Fig 2 illustrates sideways impact with an adjacent vertical structure.

Figure 1.
Swing fall as a result of incorrect anchorage line positioning.



NOTE: It is important to position your anchor point directly overhead to minimise Swing Fall Hazards. Particular attention is required when using self-retracting lifelines due to the extra mobility they provide.

Coming into contact with an object while swinging during a fall can lead to serious injuries.

Anchorage location golden rules

- Above the user where possible.
- Behind the User/ perpendicular to the leading edge where possible

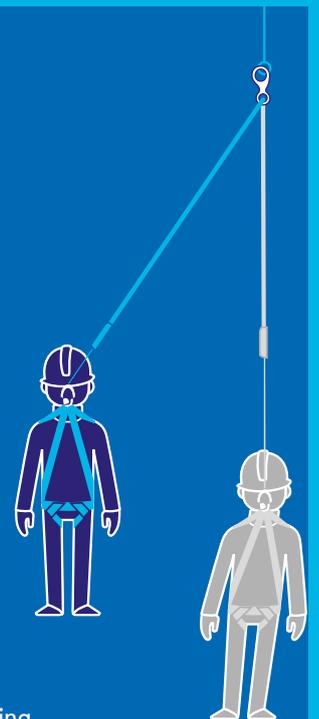


Figure 2.
Self-retracting lifeline swing fall.



D Descent and rescue devices.

Choosing rescue and descent systems.

The type of jobsite, anchor location, working load and limit and ease of use are some important considerations when choosing the appropriate rescue and descent system. The foreseeable rescue scenarios needs to be carefully considered and rescue equipment selected that would effectively rescue a casualty from these situations. We can help you choose the right system for your needs. Please contact us for more information.

For more information, see page 44.

Thanks to 3M™ Fall Protection products, for not only keeping the worker safe, but getting them safely back on terra firma has never been easier with our rescue equipment. We offer the most complete line of safe and effective rescue systems in the industry, frequently specified by Safety managers and Site Managers.

Automatic descent systems, for example our 3M™ DBI-SALA® Ultra-Lok™ RSQ™ fall arrest / emergency descent SRL, does not require manipulation by the user, you simply connect and go. Some systems allow the user to control their own descent or even that of a co-worker for flexibility, depending upon the application requirements. Automatic evacuation and emergency escape devices require the least amount of training and knowledge by the user and are often chosen by Safety Managers for their ease-of-use.

In addition to descent capabilities, some rescue systems also incorporate the ability to raise the user or victim. This function is often needed where a faller is suspended by their lanyards and needs to be lifted to release it. They also offer the options of raising the casualty back onto the platform or used in a pick off rescue where the rescuer descends to the fallen victim, connects their system to them and raises slightly to relieve the victims fall arrest system for disconnection, then descends to the ground together to complete the rescue.



**3M™ DBI-SALA®
Rollgliss™ R550
Rescue & Descent System**



**3M™ DBI-SALA®
Rollgliss™ R350
Rescue System**



**3M™ DBI-SALA®
Rollgliss™ R250
Rescue Kit**

**3M™ DBI-SALA® Ultra-Lok™ RSQ™ -
Dual Mode SRL & Descent Device**

Dual mode SRL and rescue devices.

No other brand has the exclusive DBI-SALA dual-mode descent operation! Our RSQ™ feature allows the user, prior to connection, to choose their mode of operation. This two-in-one operation lowers the cost of ownership by reducing the need for separate rescue equipment.

- Standard fall arrest mode
- Remote/Assisted descent activation options
- Automatic descent mode - self rescue





E Education and training.

Essential Skills for Working at Height.

Workers' lives are on the line every day, but ensuring their safety starts long before the job begins. No one understands this better than 3M Fall Protection. Our training is based on 65 years of expertise and jobsite implementation around the globe. When it comes to protecting your workforce, we deliver. We offer superior courses in world-class training facilities, based on standard curriculums or tailored programmes specific to your jobsite.

Our comprehensive portfolio provides practical, hands-on experience across a full range of fall protection training, fall arrest training and industrial rescue courses at our state-of-the-art training centres located across Europe, as well as on-site training customised to your needs.

To find out more, visit: www.capitalsafety-training.com or email our training team on safetytraininguk@mmm.com

On-Site Safety Awareness.

Did you know that 3M Fall Protection offer on-site safety awareness direct to your workforce?

We can bring one of our fully equipped Demo Vans to a location on a date to suit you; saving you precious time and resources.

Our hands-on fall protection demonstrations present a whole range of products required for working at heights.

Demonstration topics include:

- Drop Tests - to show the forces workers are subjected to during a fall from height.
- Equipment inspections.
- Rescue – practical demonstrations in a range of worker environments.
- Confined space – practical demonstrations of correct use of tripods and different applications of the winch.
- Understanding lifelines.
- Basic working at height guidelines.

NEW! Our demovans are now equipped with the latest Virtual Reality technology, so you can experience a fall from height scenario. A great tool to educate in a safe and controlled environment.



Open Enrolment Courses

3M Safety Training offers a vast range of courses covering the topics below. Please contact us directly for details on all courses.

- Full Range of Height Safety Courses
- Rope Access Courses
- Confined Space & Rescue Courses
- Industry-Specific & Bespoke Courses
- Health & Safety guidance and Site Surveys

On-Site Training

For greater flexibility, 3M Safety Training can bring standard courses, or a customised version, directly to your location. We will provide the necessary equipment and trainers required for your class size. Availability depends on location.

Industry-Specific and Custom Courses

In addition to basic courses, we offer courses for particular trades and specific industry work requirements. These include telecommunications, transport and logistics, manufacturing, oil and gas, wind energy, confined space access and rescue and many more.

Please contact your 3M Safety Training training provider to discuss your custom requirements. We'll also customise courses for the Emergency Services, Utilities, Transportation Infrastructure operative.



F Fall protection for tools.

Protecting workers takes more than just keeping them from falling. Their equipment also needs to be kept safe at height.

That's why for over 10 years, we've been pioneering an innovative line of products and solutions to prevent dropped tools and equipment. From construction sites to oil rigs, we help make work environments safer and more productive by protecting workers from hazards that can result in personal injury, equipment damage and tool loss.

Certified and tested.

Our onsite ISO 17025 accredited lab allows us to simulate heat, cold, moisture, corrosion and abrasion - the challenges you face every day. We conduct dynamic and static strength tests, both in the field and in our ISO 90001 certified manufacturing facilities, ensuring you get the highest quality, most reliable fall protection for tools.

**3M™ DBI-SALA®
Safe Buckets**



**3M™ DBI-SALA®
Smart Holsters**



**3M™ DBI-SALA®
Tethers and Lanyards**



**3M™ DBI-SALA®
Attachment Points**



**3M™ DBI-SALA®
Wristbands**



**3M™ DBI-SALA®
Pouches**



**3M™ DBI-SALA®
Belts**



Can you provide a prompt rescue?

While it may seem like the exact opposite is true, rescue after a fall is a good problem to have.

It means a worker was wearing their harness properly, was attached to an anchor and was utilising their gear correctly. Without a prompt rescue, the worker is at risk of sustaining medical complications or a worsening of injuries from the fall.

Why prompt rescue is critical:

Do you have a solid rescue plan?

- Are your people trained and competent in rescue techniques?
- Is your equipment adequate for your rescue plan?
- Are your team wearing their equipment properly?

Before the fall

Struck by falling object or medical condition



During the fall

Collision with part of structure



After the fall

Effects from being suspended in a harness



Prompt, effective rescue is required

Suspension intolerance primary factors

Immobility | dehydration | type of harness | age | health

Suspension intolerance is a condition brought about by compromised blood flow as a result of being suspended in a harness.

<10 min

Recommended goal for rescue time is less than ten minutes.

Certification.

The European Commission has set out Directive 89/686/EEC detailing harmonised standards intended to control the design and use of rescue and personal protection equipment against falls from height. These standards must be adhered to, and are applicable in all the member states.

Fall Protection equipment relating to any of these harmonised standards must be tested by a notified body. The CE logo marked on equipment indicates conformity.

Only approved fall protection equipment may be used when working at height. In Europe, equipment must be CE marked when used within the EU.

Always refer to the manufacturer's guidelines before use

Fall Protection equipment relating to any of these harmonised standards must be tested by a notified body. The CE logo indicates conformity.



Guided type fall arresters including a rigid anchor line

EN353-1



Test methods

EN364



Guided type fall arresters including a flexible anchor line

EN353-2



General requirements for instructions for use, maintenance, periodic examination, repair, marking & packaging

EN365



Lanyards

EN354



Industrial safety helmets

EN397



Energy absorbers

EN355



Anchor devices

EN795



Belts and restraint lanyards for work positioning

EN358



Sit harnesses

EN813



Retractable type fall arresters

EN360



Rescue harnesses

EN1497



Full body harness

EN361



Descender devices

EN341



Connectors

EN362



Rescue lifting devices

EN1496



Personal fall protection systems

EN363

Glossary of fall protection terminology.

A

ABCs of personal fall protection

The basic elements of any fall protection system are A for anchorage, B for body support and C for connectors.

Active fall protection system

A means of providing fall protection that requires employees to actively wear and use fall protection equipment, and which requires training.

Anchorage

A secure point of attachment for a personal fall arrest, fall restraint, work Positioning or rescue system.

Anchorage connector

A means of attaching a personal fall arrest, fall restraint, work Positioning or rescue system to the anchorage that comes in many common types including anchor slings, roof anchors, beam clamps, rail sliders, trolleys, eyebolts and shepherd hooks.

Arresting force

The force imposed upon the worker and the anchorage point the moment the fall arrest system stops the fall. It is measured in kilo Newtons (kN) - a maximum of 6 kN is allowable for a fall arrest systems under CE EN standards.

Attachment point

A connection point on the fall arrest harness which allows for the connection of other components of a fall protection/work positioning/descent-rescue system such as a Self-Retracting Lifeline (SRL), Lanyard assembly or other device.

ATEX

ATEX is the name given to a set of European Directives relating to Hazardous Area Installations (Flammable Atmospheres) that takes its name from the French "Atmosphères Explosibles". It sets out a set of Essential Health & Safety Requirements (EHSR) which when followed should enable everyone in the industry to operate safely and to avoid incident. Two separate directives have been introduced covering Equipment (94/9/EC) and Safety of Working Operations (1999/92/EC).

- Directive 94/9/EC applies to all equipment and protective systems to be used in potentially explosive atmospheres.
- Directive 99/92/EC refers to the minimum requirements for the improvement of health and safety at work for employees.

Authorised person

A person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or locations at the jobsite.

- The end user for fall protection equipment who has been trained to use and inspect fall protection equipment.

Authorised rescuer

An employee who has been trained to perform or assist with rescues.

Automatic descent control device

A device that, once engaged, lowers personnel at a controlled rate.

B

Back D-ring

Also known as the dorsal attachment or dorsal D-ring. Attachment point that is located on the back of the full-body harness, positioned between the shoulder blades.

Body harness

Means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching other components of a personal fall arrest system.

Body support

Comes in the form of a full body harness that provides a connection point on the worker for the personal fall arrest system. Depending on the application, they can be 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.

C

Carabiner

A link with a locking gate that is normally closed or automatically closes, and is used to connect components of a fall protection system. Also noted as a Carabiner Certified anchorage An anchorage that a qualified person determines to be capable of supporting fall arrest forces.

Climb assist

A vertical system that assists the user in the ascent or descent of a fixed ladder to reduce fatigue.

Clearance (calculation)

To determine the required fall clearance add the appropriate factors together, this will give you the safe required distance (RD) below the working surface for work which is to be carried out where there is any risk of falling. Calculation: free fall distance energy absorber deceleration distance clearance to obstruction during fall arrest

Competent person

One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees and who has authorisation to take prompt corrective measures to eliminate them.

Usually the day-to-day supervisor of individuals who work at heights. He or she conducts the fall hazard survey and identifies new and existing fall hazards and how to protect employees exposed to each hazard. The competent person may also supervise the selection, installation, use and inspection of non-certified anchorages in jurisdictions where this is permitted and verify that current systems are in compliance with applicable standards. He or she also ensures a rescue plan is in place for a fallen worker, participates in accident investigations, inspects equipment and removes from service damaged or otherwise unusable equipment.

Competent rescuer

An individual who develops procedures and methods for conducting a rescue for each foreseeable fall hazard prior to the commencement of work, ensures that the authorised rescuers have been properly trained and are proficient at performing rescues, and identifies the resources necessary to conduct a rescue and verifies those resources are on hand.

Connector (ABC's of personal fall protection)

A device that is used to connect components of personal fall arrest, fall restraint, work positioning or rescue systems. Connectors include but are not limited to lanyards, snap hooks, carabiners and Fall arrest devices and specialist systems such as self-retracting lifelines, ladder climbing systems, vertical lifelines and rope grabs.

Connector (carabiner)

A carabiner may also be referred to as a connector.

Controlled access zone (CAZ)

An area in which certain work (e.g. overhead bricklaying) may take place without the use of guardrail systems, personal fall arrest systems or safety net systems and access to the zone is controlled.

Confined space

An area that has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy.

Compatibility

Equipment is deemed compatible when they have been designed to work together in such a way that their size and shape do not cause them to separate inadvertently during use.

Counterweight system

A system that uses weights to provide a sturdy support structure to offset the weight of a worker.

D

D-Ring

A component that is integrated into fall protection equipment, commonly found on body support and some anchorage connectors, which allows for the attachment of a connecting device.

D-Ring extension

A device that connects to the rear D-Ring of a harness that enables easier connections to lanyards and other devices by extending the reach from the rear D-Ring.

Davit arm or davit post

Davits are an alternative to the basic tripod. They have a variety of base configurations to fit a wide variety of openings and holes.

Debris net

A netting system that is designed to contain debris. These systems are usually not rated for fall arrest.

Deceleration distance

The additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the fall arrest device begins to operate. It is measured as the distance between the location of an employee's body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the fall arrest device during a fall, and the location of that attachment point after the employee comes to a full stop.

Demonstration vehicle

Vehicles typically used for on-site fall protection training and demonstrations to conduct drop tests and showcase the proper use of fall protection equipment

Descent system

A system used to help safely lower a worker to a lower level of a structure or to the ground in a controlled manner.

Dorsal D-Ring

Also known as the back D-Ring. Attachment point that is located on the back of the full-body harness, positioned between the shoulder blades.

Double-leg lanyard

Also known as twin-leg lanyard. Two lanyards that are connected at one end. Used to provide 100 percent tie-off to keep the employee protected in the event of a fall at all times as he or she moves from one location to another.

Double or triple action auto-locking devices

A self-closing hook or carabiner with a gate which will automatically close and remain closed until manually opened. These units have a minimum of two (double) or three (triple) distinct and deliberate consecutive actions required to manually open them.

E

End anchor

Anchorage points on each end of the horizontal lifeline system.

Energy absorber

Also known as shock absorber. An energy-absorbing unit that will limit the force exerted on the worker in the event of a fall.

F

Fall arrest

A form of fall protection that is designed to arrest a falling worker prior to them striking an object or a lower level.

Fall arrest force

Forces exerted on the body when a fall is arrested.

Fall arrest system

Also known as a personal fall arrest system. The complete collection of equipment and components that is designed to stop a fall in progress.

Fall clearance

The vertical distance needed to safely arrest a fall, between a working point an objects or a lower level.

Fall hazard

Any location where an employee is exposed to a potential fall.

Fall indicator

A visual indicator that shows the fall arrest system or device has been used to arrest a fall.

Fall prevention

A type of fall protection that prevents a fall from occurring. This could be done through passive (Guardrails) or active (Restraint) means.

Fall protection

Methods used to minimise injury and associated costs, both monetary and human, due to falls.

Fall protection equipment

Equipment that is used by a worker to prevent or arrest a fall.

Fall protection plan

A plan that is needed whenever one or more workers are routinely exposed to fall hazards. The plan must be developed and consistently audited and updated to ensure that fall hazards are identified and controlled and that workers are aware of all hazards and trained in the appropriate control method. The plan should also include a rescue plan for each fall hazard.

Fall arrest systems

Systems that protect the worker after a fall from hitting the ground and/or obstructions below the work area.

First-man-up system

A system used to install and remove a fall protection device to an overhead location using a telescoping pole and adaptor tool.

Force

Force is measured in Newtons (N). The weight of something in Newtons (N) is calculated by multiplying its mass in Kilograms (kg) by the value of Gravity, which is 9.81 (m/s²). A Kilogram (kg) is a unit of mass (i.e. the weight of a static object).

Force = Mass x Acceleration. For rough calculation purposes: 1000 N = 1 kN,

1 kN = 100 kg, 10 kN = 1000 kg.

Free-fall

The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free fall distance

The vertical displacement of the fall arrest attachment point on the employee's body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

Frontal D-ring

A connector located on the front of a full-body harness in the sternum area.

Full-body harness

A means of supporting the body with straps that fasten around the user and distribute fall arrest forces over the upper thighs, pelvis, chest and shoulders.

G

Guardrail system

A passive form of fall prevention. Usually a barrier consisting of vertical and horizontal rails to prevent workers from reaching a fall hazard.

H

Hardware

Any metal component such as a D-ring, snaphook or carabiner used to attach components of a fall protection system.

Hierarchy of control

The hierarchy of control is a sequence of options which allow you to control a hazard from the highest level of control to the least preferred option. These measures, in order, are: identification, elimination, substitution and isolation. If these are not practical, fall protection equipment must be used.

Horizontal lifeline system

A system comprised of a flexible line such as wire, rope or cable, with connectors at both ends for securing it horizontally between two anchorages or anchorage connectors.

Horizontal life line – permanent

A permanently installed horizontal lifeline that is built into the structure for use as the anchorage not only during construction, but also for maintenance and repairs later on.

Horizontal life line – temporary

A pre-engineered horizontal lifeline system that is easy to install/remove and can be used on more than one jobsite without damaging the surface that it is attached to.

Horizontal rail system

A system comprised of a rigid rail, for use as the anchorage, secured horizontally to a suitable structure.

I

Impact indicator

A visual reference that a piece of fall protection equipment has been involved in a fall and should be taken out of service.

Inertia reel

An inertia-activated reel that retracts and releases. In the event of a fall the reel locks. Often referred to as an SRL or Blok.

Intermediate (HLL reference)

Lifeline connection points that support the HLL at mid points and divide the overall length of the HLL into smaller spans.

J K L

Lanyard

A device used to connect a full-body harness to an anchorage or anchorage connector, usually made of rope or webbing material.

Leading edge

The edge of a floor, roof or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking or formwork sections are placed, formed or constructed. A leading edge is considered to be an “unprotected side and edge” during periods when it is not actively and continuously under construction.

Lifelines (this could be for VLLs, HLLs or SRLs/SRDs)

A component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

Limited free fall

Defined as a short free fall required so that the device used in arresting the fall can activate and complete arresting the fall. Maximum free fall distances will vary somewhat depending on the device in use. Consult standards and product owner’s manual to determine maximum free fall by device.

Load arrestor

A back-up safety device to completely stop a dropping load (material loads only, not personnel) if it breaks free from the main support line. It is typically used in conjunction with lifting equipment such as cranes and hoists.

Low-slope roof

A roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

Lower levels

Those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures or portions thereof.

M

Manual descent control device

A friction device that, once engaged, requires the user to control lowering speed.

N

Netting system

Passive systems, usually designed to contain debris or for fall arrest.

Non-certified anchorage

An anchorage that a competent person determines to be adequate for the strength required for the type of fall protection system to be used, usually beams, trusses or other suitably strong structures.

O P

Pass through buckle

Is composed of two mating flat metal frames. The female frame is an open rectangle that is permanently attached to a loop at the end of a strap. The male frame is attached to the joining strap by passing the webbing through the two slots in the frame. To engage the buckle, turn the male buckle at an angle so that it will pass through the female frame. After it has passed through, turn it back so that the male frame lies directly on top of the female frame.

Passive fall protection system

A means of providing fall protection that does not require an employee to wear or actively use equipment. This includes guardrails and personnel-rated netting systems.

Permit-required confined space

A space that has one or more of the following characteristics: (1) contains or has a potential to contain a hazardous atmosphere; (2) contains a material that has the potential for engulfing an entrant; (3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or (4) contains any other recognised serious safety or health hazard (such as a fall hazard).

Personal fall arrest system (PFAS)

A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, fall arrest device, lifeline or suitable combinations of these. As of 1 January 1998, the use of a body belt for fall arrest is prohibited.

Personnel net

A netting system that is designed to withstand fall arrest forces.

Pole strap

A work positioning strap designed to be placed around a pole/structure and attached at two points, one on each side of a line worker's harness belt D-Rings while the user is working on the pole.

Positioning device

A body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

Positioning belt

A configurable device used to protect a worker at heights while allowing them to position themselves to comfortably and safely complete a task with both hands. Normally used with of combined into a full body fall arrest harness, and fall arrest system.

Programme administrator

Individual responsible for all phases of the fall protection programme, including its development, implementation and ongoing monitoring. He or she must provide guidance to all those affected by the fall protection programme, assign all duties and responsibilities, provide training programmes, participate in accident investigations and evaluate the effectiveness of the programme.

Q**Qualified person**

One who, by possession of a recognised degree, certificate or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work or the project.

- Often this is an engineer, or someone with extensive knowledge of fall protection physics and equipment use.

Quick-connect buckle

A buckle that allows for one-handed operation for fast and easy donning of a full-body harness.

R**Rescue/rescue plan**

The ability to retrieve or rescue an individual from confined spaces or heights. An effective rescue plan must always be a component of any fall protection program.

Rescue positioning device (RPD)

A rescue or positioning system that allows the worker to simply raise or lower himself or someone else to a work level.

Rescue system

Equipment and components used to help a fallen worker return to the ground or location from which he or she fell, or that retrieves or evacuates an employee from dangerous situations or confined spaces.

Restraint system

An active form of fall prevention used to prevent a worker at heights from getting too close to the edge of a structure where a free fall could occur commonly includes a full body harness, lanyard and anchorage connector.

Risk assessment

The evaluation of hazards within the worksite which have the potential to cause serious injury or illness.

Roll out / forced roll out

A circumstance when force is applied to the secure front locking gate on a carabiner or snap hook connector in such a way that it unintentionally opens or collapses, creating a disconnection in the fall arrest system.

Rope grab

A fall arrest device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking or both.

Roof

The exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily becomes the top surface of a building.

Roofing work

The hoisting, storage, application and removal of roofing materials and equipment, including related insulation, sheet metal and vapour barrier work, but not including the construction of the roof deck.

S**Safety-monitoring system**

A system in which a competent person is responsible for recognising and warning employees of fall hazards. A means of administrative controls.

Safety sleeve

For vertical systems, it shall be operated entirely by the person using the ladder safety system. It shall permit the person using the ladder safety system to ascend or descend without having to continually manipulate the safety sleeve.

Self-retracting lifeline/self-retracting device

A fall arrest device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

Service centre (Factory authorised)

A centre that has been approved by the manufacturer to repair and certify equipment.

Shock absorber

Also known as an energy absorber. An energy-absorbing unit that will limit the force exerted on the worker in the event of a fall.

Shock-absorbing lanyard

A connective device used with a personal fall arrest system that features an integral shock absorber to dissipate the energy of a fall, limiting fall arrest forces.

Shock-absorbing stretch lanyard

A connective device used with a personal fall arrest system that expands and contracts following the employee's movement. Helps prevent trips, falls and snags.

Shock pack

Part of the shock-absorbing lanyard that contains the energy absorber that will be deployed in the event of a fall.

Shuttle

For Horizontal systems, it shall be operated entirely by the person using the horizontal safety system. It shall permit the person using the horizontal safety system to freely move along the length of the system without having to continually manipulate the shuttle.

Snaphook

A connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. As Snaphooks are connectors they must have at least 2 actions to open the keeper from its locked position.

Guide to fall protection for workers at height

Span

The distance between intermediates or anchor points for a horizontal lifeline system.

SRL

A self-retracting lifeline, is an inertia-activated reel that retracts and releases. In the event of a fall the reel locks. Often referred to as a Blok.

Steep roof

A roof having a slope greater than 4 in 12 (vertical to horizontal).

Sub-pelvic strap

A strap incorporated into a full body harness which passes under the buttocks connecting the two leg loops. It is designed to distribute the forces throughout the lower body to reduce the possibility of injury following a fall.

Suspension trauma

A condition that occurs when an employee is suspended in a harness after a fall, due to the restriction of blood flow. Can result in severe brain damage or even death and may occur in as little as fifteen minutes.

Suspension trauma straps

A device that can be attached to or is integral on a full-body harness that is deployed following fall arrest and used to minimise the impact of suspension trauma. Also referred to as Suspension relief straps.

Swing fall

A pendulum-like motion resulting from a fall that occurs in a position located horizontally away from the anchorage.

T

Tie back lanyard

Acts as both the connecting means and an anchorage connector and comes in two styles. One incorporates an adjustable D-Ring on the lanyard for attaching the snap hook and the other is designed for the hook to go around the webbing itself, which requires a specialist hook with a gate strength capacity of 5,000 pounds (22 kN).

Tie-off adapter

Alternative anchorage connectors for a fall arrest system made of different materials, including cable, web and chain.

Travel restraint

Control on a person's movement by connection to an anchorage to physically prevent the person from reaching a position at which there is a risk of a fall hazard.

Tripods

Lightweight, portable devices to provide an overhead temporary anchorage, usually used for manhole entry and retrieval applications.

Tongue buckle

Similar to a belt buckle, the worker inserts the webbing strap through the buckle and places the buckle tongue into the grommet hole and adjusts for proper fit and comfort.

Trolley

An anchorage connector that rolls along the I-beam to provide horizontal mobility to the worker.

Twin-leg lanyard

Also known as double-leg lanyard. Two lanyards that are connected at one end. Used to provide 100 percent tie-off to keep the employee protected in the event of a fall at all times as he or she moves from one location to another.

UV

Vertical lifeline system (VLL)

A system comprised of a flexible line such as wire, rope or cable, with a connector at the upper end, along which a fall arrester travels.

W

Walking/working surface

Any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles or trailers, on which employees must be located in order to perform their job duties.

Webbing

Woven fabric used on fall protection equipment components such as full-body harnesses and lanyards.

Wedge grip

Easily adjusted termination for wire rope cable, requires no tools to install and is 5,000 lb. (22 kN) rated.

Winch

A device that lifts and lowers loads and contains a mechanism that controls pay-out and take-up of the line. Provides a mechanical lifting advantage.

Work area

A portion of a walking/working surface where job duties are being performed.

Work positioning

A personal fall protection system which enables a user to work supported in tension or suspension in such a way that a fall is prevented or restricted. Normally used in conjunction with a fall arrest system.

Work positioning belt

A configurable device used to protect a worker at heights while allowing them to position themselves to comfortably and safely complete a task with both hands. Normally used with or combined into a full body fall arrest harness, and fall arrest system.

WARNING: This booklet is a general reference guide and does not replace the requirement for competency based training.

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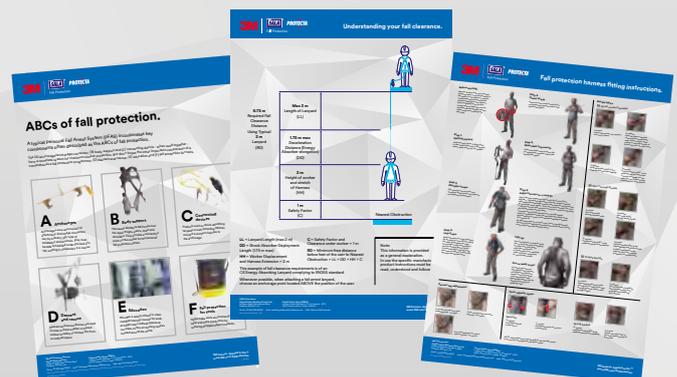
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