

# MSA Fall Protection Solutions for Roofing



WE KNOW WHAT'S AT STAKE.

## Introduction



Falls from height are the single biggest cause of death and one of the biggest causes of serious injury in the workplace today. For businesses whose workers need to operate quickly and effectively at height, fall protection is already a major issue—and this will become increasingly important as regulatory authorities introduce ever-stricter rules governing:

- Where height safety should be implemented
- The systems that are acceptable for use
- Who is responsible for ensuring worker safety

### Are you responsible?

The answer could well be ‘Yes’. According to the health and safety legislation these people are ‘duty-holders’—responsible for ensuring adequate fall protection and potentially liable in the event of an accident.

#### What you need to do

The official advice to duty-holders can be summarised as follows:

- Avoid work at height, where possible
- When working at height is essential, ensure that workers are not exposed to unnecessary risks
- Where it is not possible to eliminate the risk of falling, use a suitable fall protection system to minimise the consequences of a fall

Principal Designer

Designer

Health and Safety

Manager

Facilities Manager

Co-ordinator

Principal Contractors/  
Sub-Contractor

Client/Building Owner





## Rooftop fall protection examples

1. Roof Access:  
Access via ladders and roof hatches
2. Roof Edges:  
Access required for gutter cleaning, leakage checks, inspection and maintenance to the rest of the roof
3. Roof Plant:  
Air conditioning units, satellite dishes and solar panels all need regular checks
4. Walkways:  
Walkways should be accompanied by a fall protection system
5. Rooflights:  
Fall protection required for cleaning and maintenance

## All roofs require some form of access for:

- General maintenance
- Structural/performance checks for warranty maintenance
- Plant access

## What type of fall protection system should you install?

MSA has developed an easy-to-use assessment method to help establish what type of system is required for permanent access. There are a number of key considerations that will help decide what type of system needs to be installed and therefore minimise risk:

- Experience of the worker(s) accessing the system
- Number of worker(s) accessing the system
- Duration of the worker(s) on the system
- Frequency of use

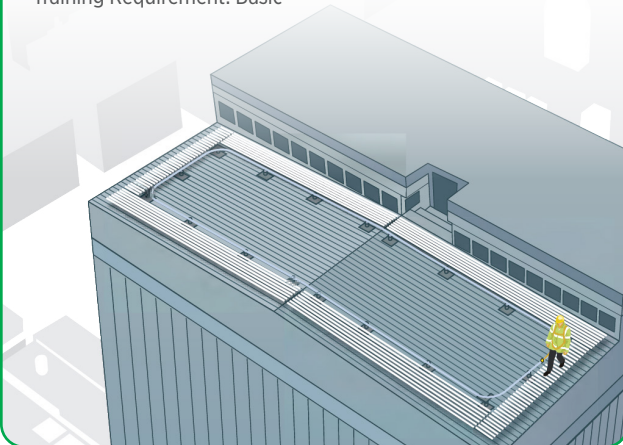
In most cases, unless specialist rope access is required, it is best practice to assume that the worker has only basic experience. The illustrations below are designed merely as a guide to the options that are available if guardrail is not an option. In all cases a propriety walkway, such as WalkSafe® is recommended to accompany the fall protection system to provide a safe means of access to the place of work. WalkSafe also ensures the rooftop is protected from any possible damage caused during regular cleaning and maintenance of plant, gutters, down pipes etc.

MSA's in-house design team can further advise on the most appropriate system for your particular requirement. For advice on system design and specification, [contact us](#)

Solution: Fall Restraint\*

No lanyard adjustment required (perimeter system)

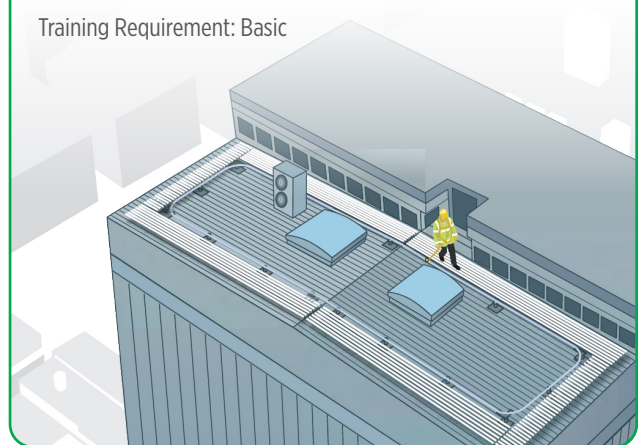
Training Requirement: Basic



Solution: Fall Arrest\*\*

No lanyard adjustment required (perimeter system with fall hazards present)

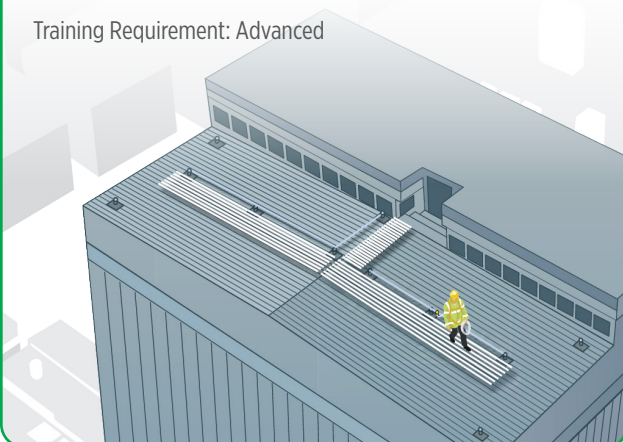
Training Requirement: Basic



Solution: Fall Arrest\*\*

Lanyard adjustment required (ridge system with anti-pendulum posts)

Training Requirement: Advanced



\*Restraint system—system is located so a worker on a fixed-length lanyard cannot reach any fall hazard.

\*\*Arrest system—system location is restricted and fall hazards can be reached by a worker on a fixed or variable length lanyard.



In April 2005 the HSE published the Work at Height Regulations (WAHR). These regulations brought together the relevant parts of the Construction (Health, Safety and Welfare) Regulations 1996 (CHSWR), the Workplace (Health, Safety and Welfare) Regulations 1992 and the Construction (Design and Management) Regulations (CDM).

These regulations all have references to working at height and are incorporated within the WAHR. The WAHR also implement the European Community Temporary Work at Height Directive (2001/45/EC), which is the second amendment to EC Directive (1989/655/EEC) on the provision and use of work equipment. These were further updated in 2007 and subsequently in 2015.

## Construction (Design and Management) Regulations 2015 (CDM)

As with the original 1994 legislation, and the subsequent 2007 update, the Regulations continue to place duties on all those who can contribute to the health and safety of a construction project i.e. clients, designers, contractors and planning supervisors, requiring the production of certain documents, the health and safety plan and the health and safety file.

Specifically the principle designer's &/or principle contractor duties include the avoidance of risk to people

1. carrying out construction work
2. cleaning & maintaining
3. using a structure as a place of work
4. demolition & dismantling
5. others who may be affected by the above

The main changes in the 2007 Regulations were made to simplify the existing system by unifying CDM and the Construction (Health, Safety & Welfare) Regulations 1996 into a single package. Additionally there is a more explicit duty on architects to eliminate hazards and reduce risks during the design stage as far as is reasonably practicable, plus there is a new duty to ensure that workplaces comply with Construction (Health, Safety and Welfare) Regulations.

The 2015 regulations state that the Principle Designer is responsible for planning, managing, monitoring and coordination health and safety in the pre-construction phase of a project. They must also identify, eliminate and control foreseeable risks – as a result, any changes made to design during the execution of a project must be communicated to the Principle Designer (or Principle Contractor, whomever is instructed by the client to take project lead) and receive their approval.

The legislation recognises that fall protection specifics are difficult to determine and hence legislate for. It allows some flexibility in interpretation and guidance but those responsible for providing adequate fall protection must be able to demonstrate that they have minimised risk, specified suitable equipment, considered the ability of the user and appreciated the conditions in which the system is likely to be used. The duty-holder must have evidence that these issues have been considered and addressed in the risk assessment.

In addition to these key pieces of legislation, the Booklet HSG 33 'Health and Safety in Roof Work' gives extensive guidance on how to work safely on roofs. It covers new buildings, repair, maintenance, cleaning work and demolition. It points to the principal problems, notably falls through fragile roofing materials and falls from unprotected roof edges and warns that many may undertake maintenance work with little or no experience of roof work or of working at height.

MSA can advise and assist with compliance; for further information [contact us](#).



## Quality products

Leveraging decades of experience through the Latchways' heritage, MSA's primary focus with the Engineered fall protection product range is to supply fall protection products for all areas of industry, construction and maintenance. Installations include stadia, retail outlets, transmission towers, industrial complexes and notable sites such as Eden Project, Pier 6 at Gatwick Airport, Hong Kong Airport and Grand Central Station in New York. MSA has worked closely with the major roofing manufacturers to produce a full range of fall protection systems for all designs and types of roofs.



### Constant Force® Fall Protection Innovation

MSA has taken the science of Constant Force and applied it to the fall protection industry providing an easy-to-install, reliable and cost-effective solution to rooftop safety.

The principles of fall arrest are based on effective load control. A system must be able to withstand the force of a person's fall and absorb the energy generated. Traditionally this was achieved by attaching the system to the structure of the building with the anchor point absorbing the load. This inherently caused difficulties for designers and installers as the system location was determined by the structural elements of the building.

System installation was time consuming as fixings had to be made from above and below. Such an installation method can create issues regarding warranties, leakage and cold bridging.

The Constant Force post does not need to be fixed to the building structure therefore simplifying installation (see pages 8 & 9). The Constant Force technology allows the load generated in the event of a fall to be absorbed through the entire system, as illustrated in the graph below.





In addition to 'in-house' evaluation, MSA Fall Protection Engineering system products are tested externally by notified independent test bodies. All systems are hold EC Declarations of Conformity.

## The key European standards are:

- EN 353-1 Personal Protective Equipment (PPE) against falls from a height. Specification for guided type fall arresters on a rigid anchorage line
- EN 353-2 PPE against falls from a height. Guided type fall arresters including a flexible anchor line
- EN 341 PPE against falls from a height—Descender devices
- EN 354 PPE against falls from a height—Lanyards
- EN 355 PPE against falls from a height—Energy absorbers
- EN 358 PPE for work positioning and prevention of falls from a height—Belts for work positioning and restraint and work positioning lanyards
- EN 360 PPE against falls from a height—Retractable type fall arresters
- EN 361 PPE against falls from a height—Full body harness
- EN 362 PPE against falls from a height—Connectors
- EN 363 PPE against falls from a height—Fall arrest systems
- EN 364 PPE against falls from a height—Test methods
- EN 795 PPE against falls from a height—Anchor devices — Requirements and testing
- CEN/TS 16415:2013 against fall from height—Anchor devices. Recommendations for anchor devices for use by more than one person simultaneously

The key standard is EN 795 which relates to the anchor devices.

Developments in technology mean that the nature of the anchor device has changed. As such, MSA conduct full roofing system tests (6 m x 6 m) to replicate the in-situ installation. This is a minimum requirement where top-fixed solutions are concerned.

Constant Force systems are recommended and approved for use by most roofing manufacturers.

Details of how the systems fit on all major roof types are available on request



## Constant Force post: Fixing details

Constant Force systems offer a complete fall protection solution for both fall restraint and fall arrest. The simplicity of the fixings allows a quick and easy installation providing safe solutions where workers are exposed to a fall hazard. System design can be verified with MSA software.

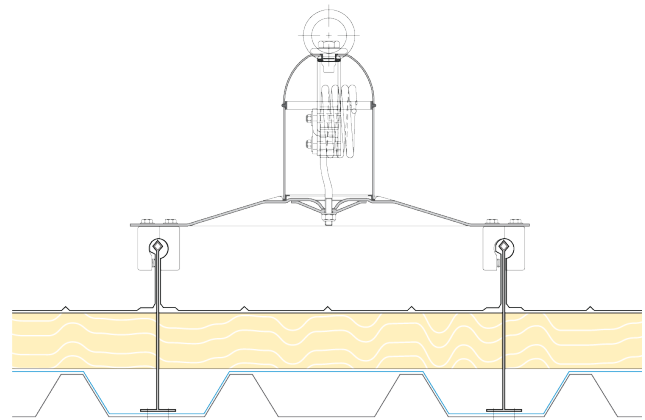
MSA works with all major roof manufacturers. To understand how posts fix to manufacturers' individual roofing systems please [contact us](#)

A variety of base plates are available to fit all roof configurations:

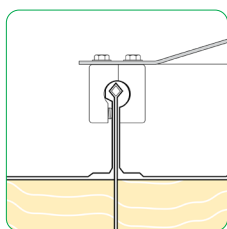
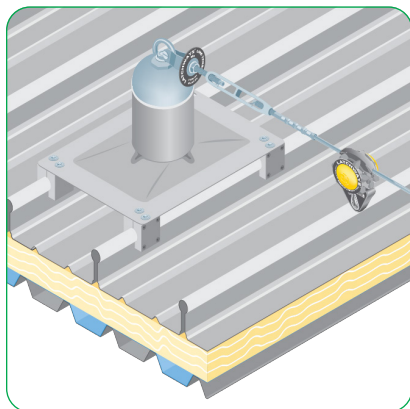
Roof type	Fixing dimensions (mm)
Standing-seam	300/305/333/400/500
Composite and built-up-on-site (BUOS)	250/300/333/400/500
Secret-fix	500/532
Steel deck	210/459
Concrete deck	210/459
Timber deck	210/459

### Key advantages

- System technology limits load to 10KN (Type 1) or 6.5 KN (Type 2) in the event of a fall
- Top-fixing ensures quick and easy installation
- Reduces cold bridging aiding compliance with Part L
- Does not invalidate roofing warranty
- System location not restricted to buildings' structural elements
- Option of powder coating posts to match roof
- Suitable for use on a roof pitch up to 15°

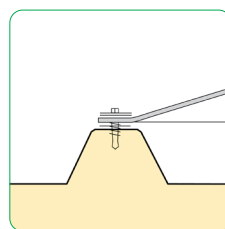
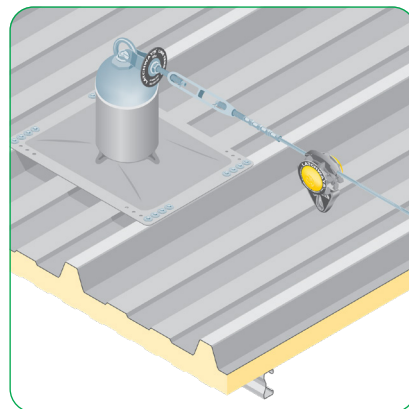


Constant Force post on standing-seam roofing



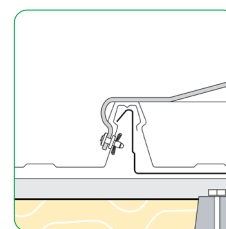
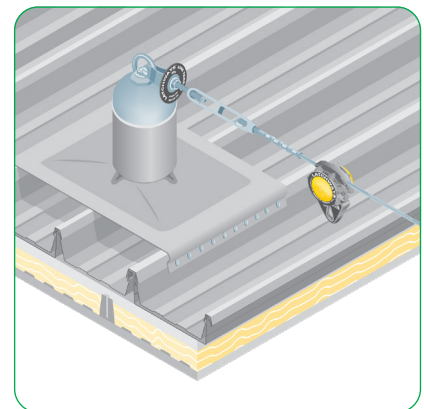
Fixing method:  
4 split clamps

Constant Force post on composite/BUOS roofing



Fixing method:  
16 stitching  
screws/bulb  
tite rivets

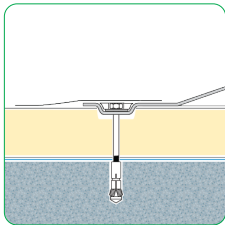
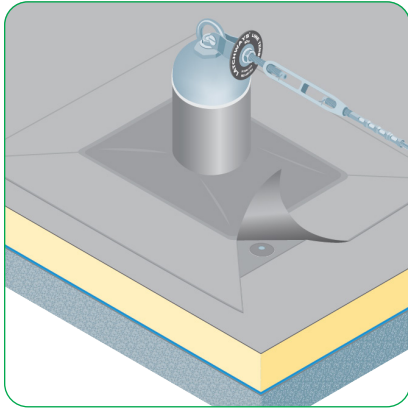
Constant Force post on secret-fix roofing



Fixing method:  
20 bulb tite  
water seal rivets

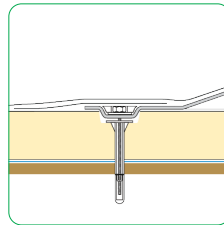
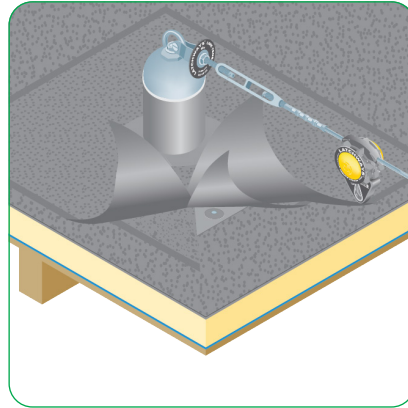


Constant Force post on concrete deck flat roofing



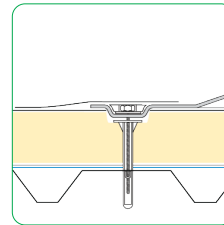
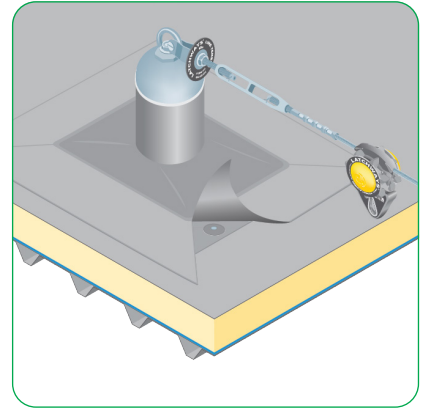
Fixing method:  
4 M8 mechanical  
fixing anchorages

Constant Force post on timber deck flat roofing



Fixing method:  
4 toggle bolts

Constant Force post on steel deck flat roofing



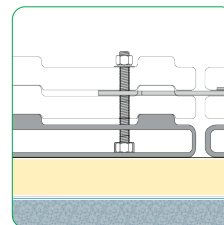
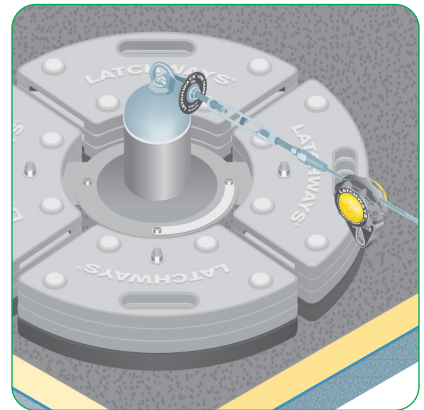
Fixing method:  
4 toggle bolts

## Freestanding Constant Force post

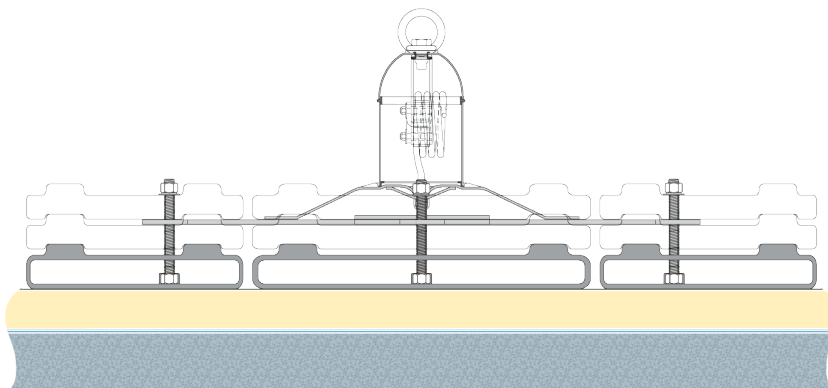
Freestanding Constant Force post is suitable for applications where roof penetration is not required or possible. It is available as a restraint or an arrest system and can be used singularly or in series, varying the number of sections to suit the application.

Single anchor for 1 user only, cable system for max 2 users.

Freestanding Constant Force concrete deck flat roofing



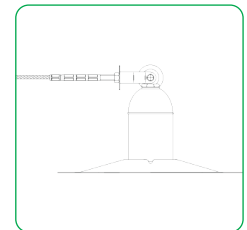
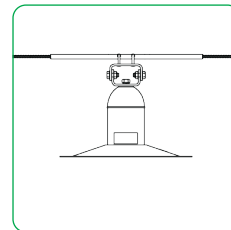
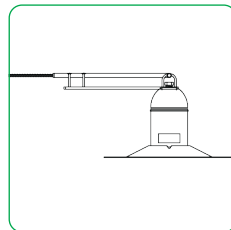
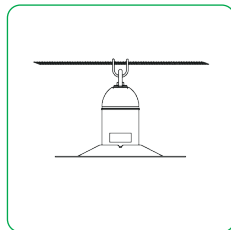
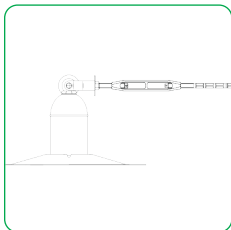
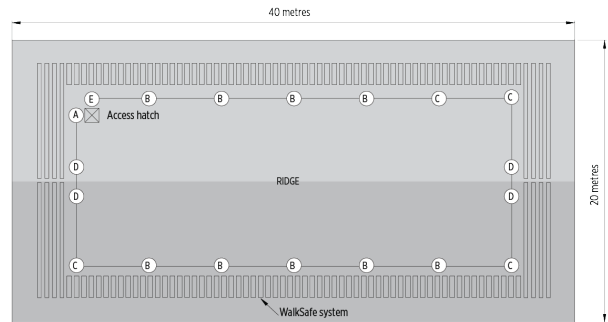
Consists of  
weighted  
segments



## Constant Force post: System design

A typical roof layout for a perimeter system is illustrated identifying the different system components. Posts must not be spaced more than 12.5 m apart. Designers should try to ensure that access to all areas is achieved without the requirement for PPE (Personal Protective Equipment) adjustment. MSA provides a bespoke Engineered fall protection system design service for your project requirements

**Contact us**



### System components

The following components complete the system allowing hands-free operation. Latchways components are manufactured in marine-grade stainless steel and are individually numbered to allow complete traceability. Inspection and maintenance are required annually.

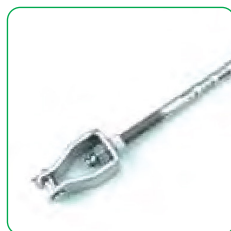
### Transfasteners

The user, wearing a full body harness and energyabsorbing lanyard, is continuously attached to the system with a Transfastener™, which rotates allowing it to pass through the intermediate cable supports. For systems on inclines over 15° a ClimbLatch device is required instead of the Transfastener.40



#### Turnbuckle assembly

The turnbuckle assembly provides a cable termination and method of tensioning the system. The integral indicator disc will spin when the correct tension is reached.



#### Swage & Clevis

The swage and clevis unit provides the method of terminating the cable at the opposite end of the system to the turnbuckle assembly.



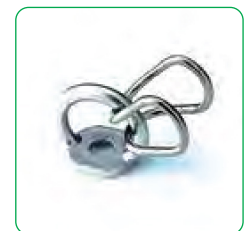
#### 90° Corner bracket

This one-piece corner bracket attached to an intermediate post provides an angle change of 90° within the system.



#### Variable bracket

This bracket attaches to an intermediate post and provides an angle change of between 0 and 80° both in the horizontal and the vertical plane.



#### D Ring & Hanger

The D ring and hanger form an intermediate cable support. The cable is threaded through the hanger allowing the Transfastener to travel the length of the system without disconnecting.



In nearly all instances it is impractical to prevent roof access, therefore the ideal solution is to create a level, anti-slip surface with all fall hazards protected against. WalkSafe provides a demarcation route, guiding a workers' movement in areas where there are potential fall hazards. Manufactured from recycled PVCu, WalkSafe has an anti-slip surface and is attached to the rooftop.

In potentially highly trafficked areas of roofing, where regular access may be required for maintenance regimes, plant inspection, air quality monitoring, rooflight cleaning, etc, WalkSafe distributes the load evenly on the roof and thus reduces wear and tear on the roofing system itself.

WalkSafe is designed to work on all major roof systems: standingseam, composite, built-up-on-site, secret-fix and single-ply membrane. Bespoke WalkSafe solutions for cementitious, slate and bituminous roofing are available upon request.

## Key advantages

- Lifespan in excess of 25 years (BBA Certified)
- BBA Certified for slip resistance
- Manufactured from re-chipped window profiles and can be recycled
- Lightweight construction
- Designed for use on all major roofing systems
- Manufactured in the UK
- Fire resistance—Class 1Y against B476 fire resistance test
- Undergone full ACRM Fragility of Roofing Assemblies testing



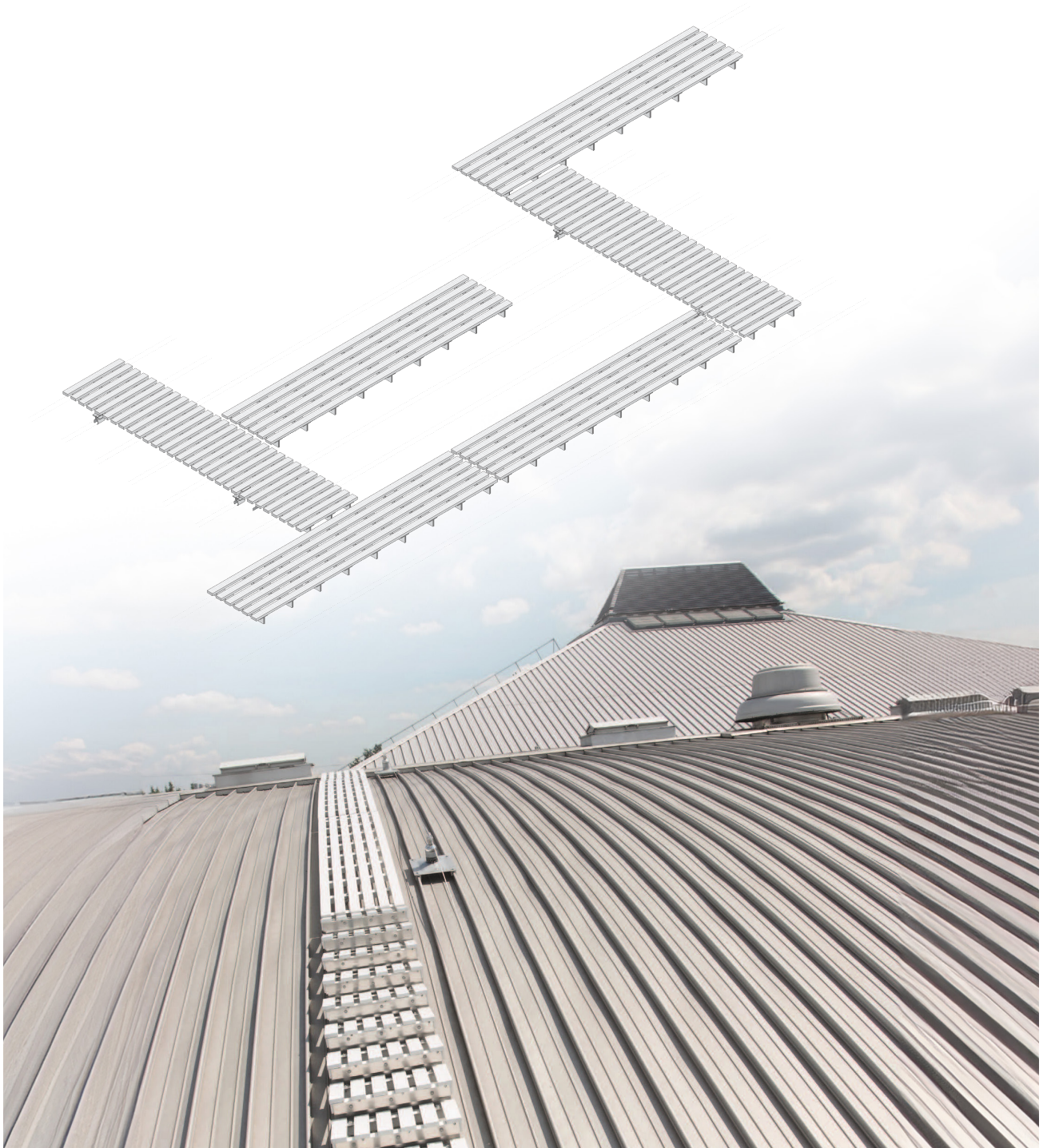


## WalkSafe: System layout

The orientation of the WalkSafe planks within a system is described as either shortways (running across the roofing profile) or longways (with the roofing profile).

The system can be configured in four ways to cover corners and change of directions:

As T-section, longways to shortways or vice versa, or as corner section either to shortways 'end' or longways 'side'.

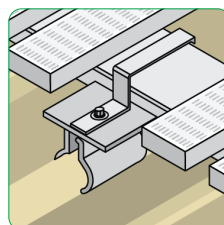
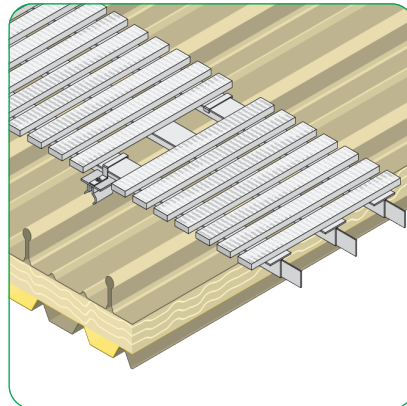


## Fixing information

The simplicity of the WalkSafe system allows a quick and easy installation.

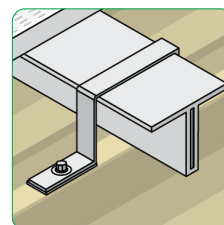
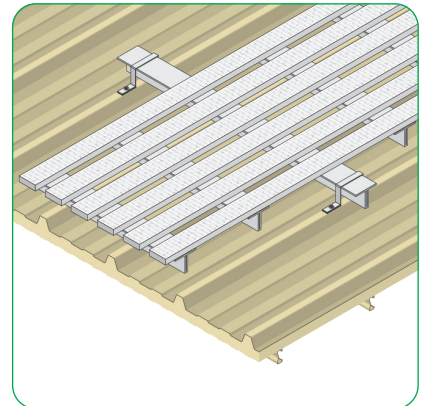
The 3-metre-long panels only require top fixing to the roofing system. In most cases the fixings are nonpenetrative.

Shortways system on standing-seam roofing



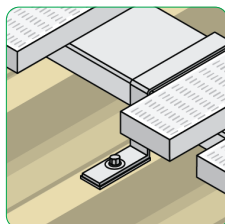
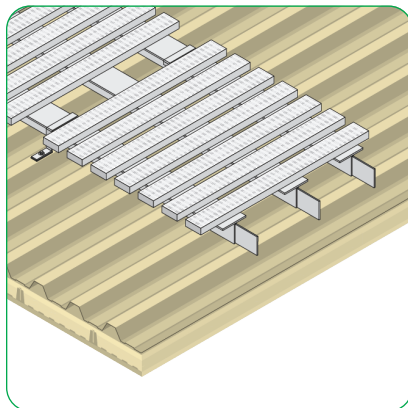
Fixing method:  
Standing-seam  
clamps

Longways system on composite roofing



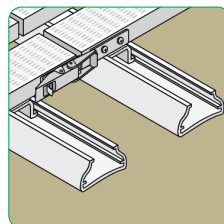
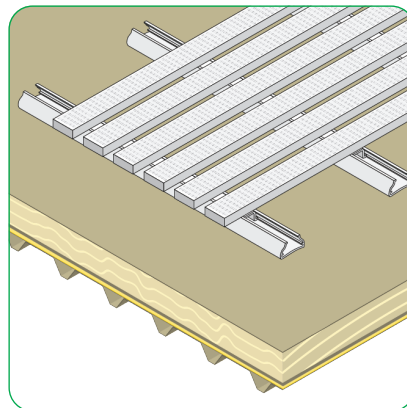
Fixing method:  
Retaining  
brackets

Shortways system on built-up-on-site roofing



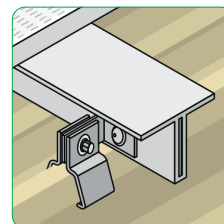
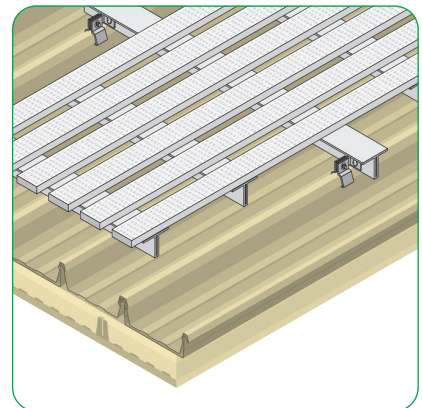
Fixing method:  
Retaining  
brackets

Longways system on single -ply membrane roofing



Fixing method:  
Self weighted—  
panels are joined  
with toggle clamp

Longways system on secret-fix roofing



Fixing method:  
Secret-fix clamps



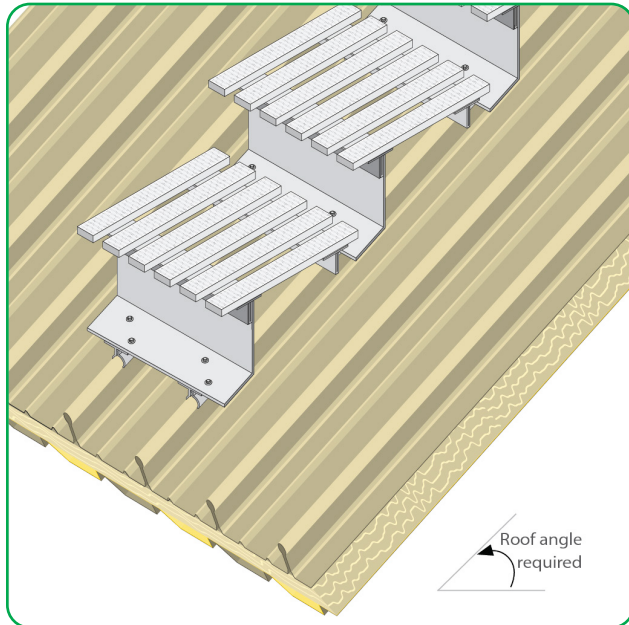
## WalkSafe: Pitched roof system

WalkSafe's design flexibility allows it to be used as levelled walkways allowing safe access to all parts of the roof on slopes up to 45°, or as steps on steeper gradients.

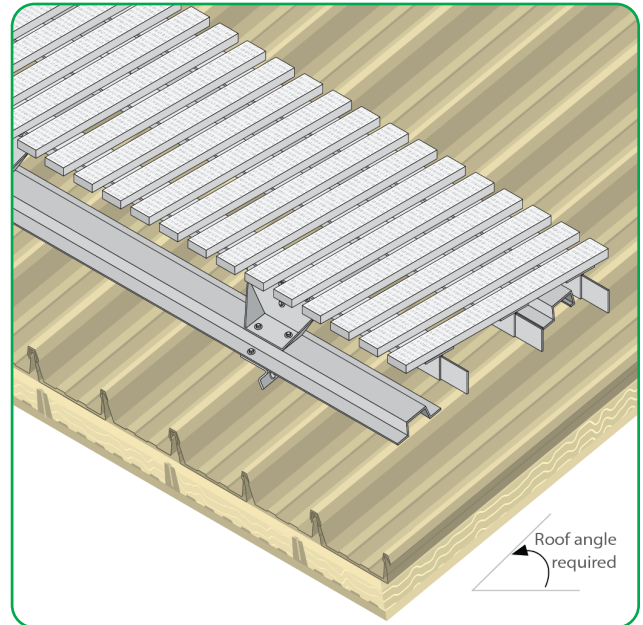
Where a level walkway is required it is key that the correct roof angle is identified as the levelling brackets are purpose-built for each job.

Traversing WalkSafe systems utilise different components to the stepped systems, therefore careful consideration must be given when detailing those areas which require access.

### Steps on standing-seam



### Traversing secret-fix

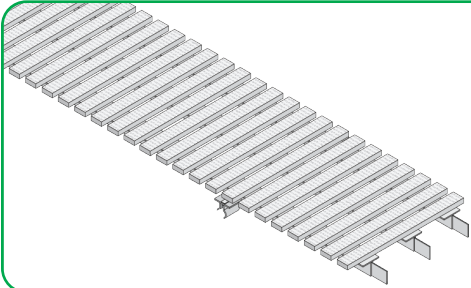




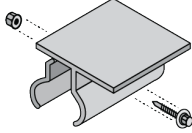
Longways system for composite roofing



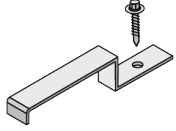
Retaining bracket



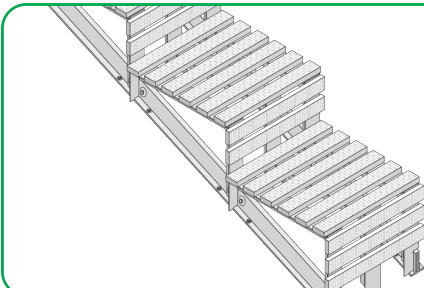
Shortways system for standing-seam roofing



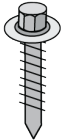
Standing-seam clamp



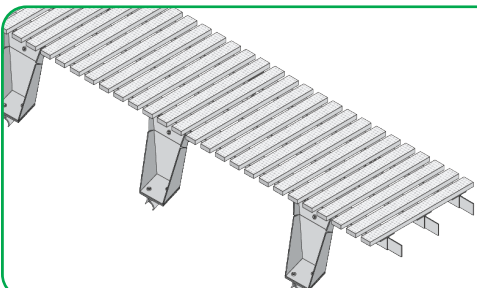
Retaining bracket



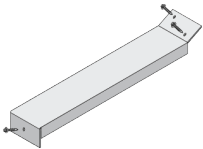
Stepped system for composite roofing



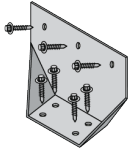
Self-tapping screw



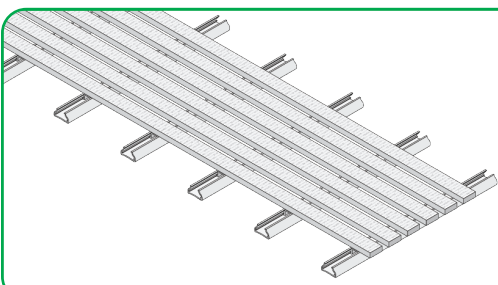
Transversing shortways system for standing-seam roofing



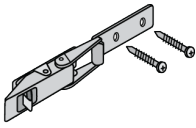
Support rail



Retaining bracket



Longways system for single-ply membrane roofing



Toggle clamp



# MSA—The Safety Company

*Established in 1914, MSA Safety Incorporated is the global leader in the development, manufacture, and supply of safety products that protect people and facility infrastructures. Many MSA products integrate a combination of electronics, mechanical systems, and advanced materials to protect users against hazardous or life-threatening situations. The company's comprehensive product line is used by workers around the world in a broad range of markets, including the oil, gas, and petrochemical industry, the fire service, the construction industry, mining, and the military. MSA's core products include self-contained breathing apparatus, fixed gas and flame detection systems, portable gas detection instruments, industrial head protection products, firefighter helmets and protective apparel, and fall protection devices. With 2020 revenues of \$1.35 billion, MSA employs approximately 5,200 people worldwide. The company is headquartered north of Pittsburgh in Cranberry Township, PA, and has manufacturing operations in the United States, Europe, Asia, and Latin America. With more than 40 international locations, MSA realizes approximately half of its revenue from outside North America. For more information visit MSA's web site at [www.MSAafety.com](http://www.MSAafety.com).*

## Our Mission

MSA's mission is to see to it that men and women may work in safety and that they, their families, and their communities may live in health throughout the world.

## MSA: WE KNOW WHAT'S AT STAKE.

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