

# Anchorage Systems Operation & Maintenance Manual





# Anchorage Systems



## INTRODUCTION

External works often require access from the inside of a premises as well as from the outside, for example, window cleaning or minor maintenance operations. In these cases, eyebolts, roof anchors and ladder restraints are the most common and user friendly solution to ensuring operative fall arrest safety.

## LEGISLATION

BS 8213 Part 1: Windows, doors and rooflights provides guidance for designers on the reach limits in relation to cleaning. Should these limits need to be exceeded, then suitable anchorage points in accordance with BS EN 795: Protection against falls from height anchorage devices - Requirements and testing, need to be provided for the operative to attach via a lanyard and harness. These structural anchorage points should be installed and tested to BS 7883: Application and use of anchor devices conforming to BS EN 795. Regulation 16 of the Workplace (Health, Safety and Welfare) Regulations deals with the ability to clean windows etc safely. Under the Regulation, paragraph 156, "suitable provisions should be made so that windows and skylights can be cleaned safely if they cannot be

cleaned from the ground or other surface." Suitable provisions may include the fitting of access equipment or providing suitable conditions for the future use of mobile access equipment, including ladders up to 9m long. Where a ladder over 6m is required, suitable points for tying or fixing the ladder should be provided. Suitable and suitably placed anchorage points for safety harnesses should also be provided. The Work at Height Regulations 2005 require that the employer/building owner has a rescue plan and policy in place for all fall arrest systems

## INSTALLATION

Installation is carried out in accordance with BS 7883. In relation to fall arrest products installed in brickwork or concrete, it is necessary to place an axial proof load test of 6kN for 15 seconds to confirm the fixing. In the case of through fixing, these are set to a torque of 35Nm. Ladder restraints require a tensile proof test load of 2.4kN for 15 seconds.

## ANNUAL RECERTIFICATION

Fall arrest products should be recertified in accordance with BS EN 365: Personal Protective Equipment against falls from height - General requirements for instructions for use and for marking. This can be carried out by Safesite as a service contract and included within the quotation for the system. Where ladder restraints are concerned, there are no requirements for annual re-certification, however, the straps, ratchet and "J" hooks must be visually inspected by a competent person every time they are used.

## INSTALLATION - NATIONAL BALLET

A number of permanent fall arrest eyebolts have been installed to enable safe maintenance to be carried out at the English National Ballet's headquarters at Markova House in London. Named after Dame Alicia Markova who was a co-founder of the English National Ballet, Markova House is a listed building. This meant that as well as providing a fall arrest solution, the installation also needed to complement the aesthetics of the building. Safesite's eyebolts provided the perfect solution by blending in with the building's façade and allowing general



# Anchorage Systems



maintenance work or window cleaning operations to be carried out without a threat of workers falling. Safesite offers both permanently installed eyebolts such as those used at Markova House, or removable systems where the sockets are permanent but the eyebolts can be removed when not in use. The eyebolts are available in a standard galvanised steel, stainless steel finish or can be white plastic coated. So that the installation did not detract from the building's aesthetics, white plastic coated eyebolts were specified for Markova House.



## INSTALLATION - WOLVERHAMPTON WFC

Safesite's eyebolts have been installed at Molineux, the prestigious home of Wolverhampton Wanderers Football Club to ensure complete safety during maintenance work at the Club's new stands. Following the £20 million redevelopment of the Stadium, maintenance work to the new Jack Harris, John Ireland, Stan Cullis and Billy Wright Stands required frequent access to high level areas. Safesite carried out a professional inspection and risk assessment of the stands in conjunction with the Club's Management. With Safesite's comprehensive understanding of current health and safety legislation governing working at height, combined with an extensive range of products, it was decided that safe access to all the high level areas of the Stan Cullis and Billy Wright Stands was best achieved using three Safesite fall arrest systems. High level access to the Jack Harris and John Ireland Stands required separate assessment due to their differing architecture. Here it was decided that permanent fall arrest eyebolt fixings would provide the best anchorage protection for operatives working at high level.



NOTE: When using fall arrest equipment such as eyebolts, it is essential that only "fall arrest anchorages" manufactured and installed to the requirements of BS 7883 and BS EN 795 are used and that the work is carried out by qualified companies experienced in the field of fall arrest installation.

# Anchorage Systems Specifications



## PRODUCT SPECIFICATION GENERAL

Cleaning windows may expose the window cleaner to potential fall risks. In these instances one may specify eyebolts in order to provide a Class A1 anchorage point to which a shock absorbing lanyard can be attached. The lanyard is then connected to the full body harness being worn by the operative.

General guidance concerning reach limits and cleaning is provided within BS 8213 : Part 1 Windows doors and rooflights

## INSTALLATION

Kee i-bolts® are installed and comply with the recommendations of BS EN 795 and BS 7883. The given structure must be of adequate construction to be able to sustain the likely imposed loads, this to be confirmed by a qualified engineer.

## PRODUCT MATERIAL & DESIGN

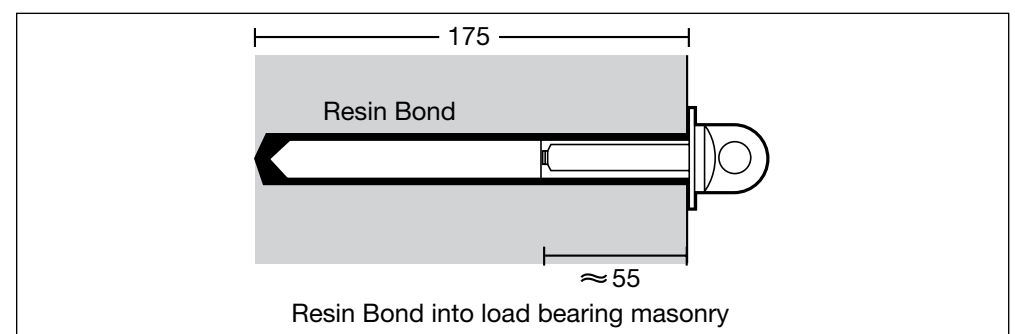
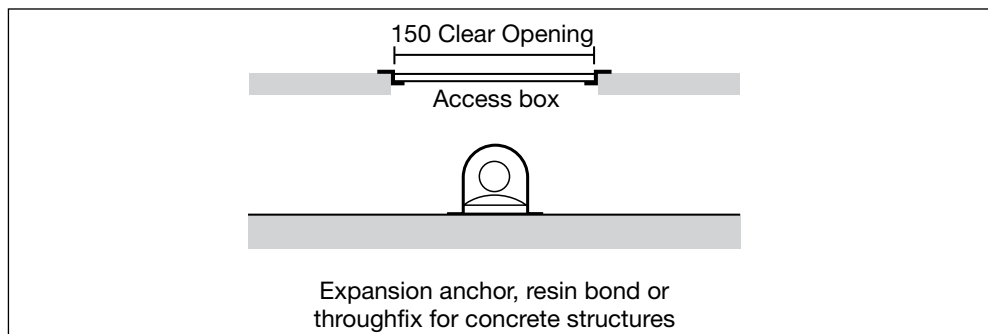
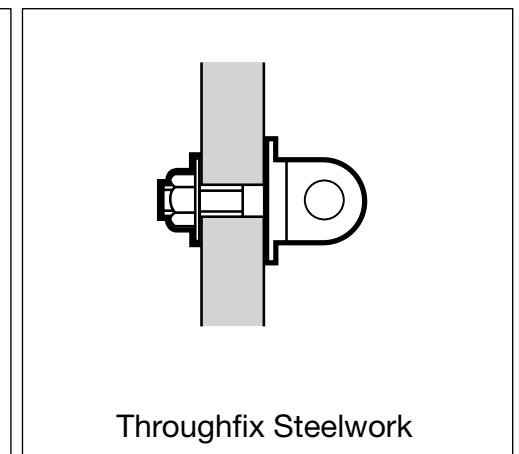
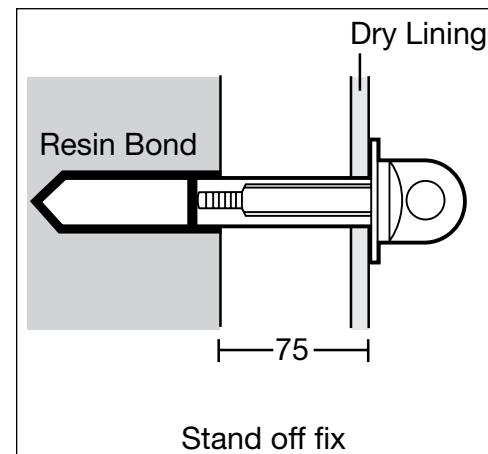
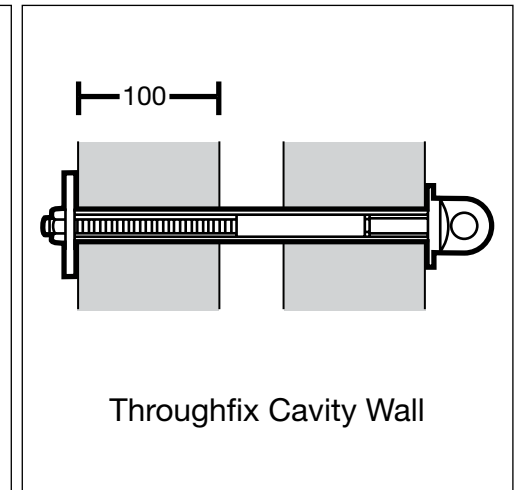
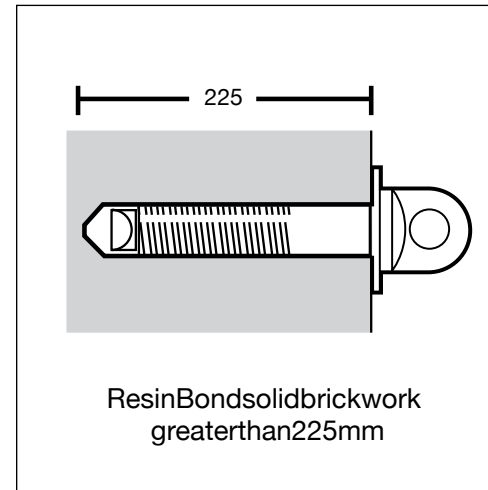
Kee i-bolts® are statically tested to 12kN and available in standard galvanised finish to BS EN ISO 1461 or Polyester White Gloss to BS 6496 amended and BS 6497 amended or stainless steel 316 grade. The structure determines the method of fixing as illustrated in the diagrams.

## MAINTENANCE - RECERTIFICATION

BS EN 365 Personal Protective Equipment against falls from height - General requirements for instructions for use and for marking.

The recertification procedure entails the removal of the eyebolt for visual inspection purposes to check for deterioration, re-insertion of the eyebolt together with a new identification tag providing the installation and re-testing dates. The eyebolt is then tested in tension to 6kN for 15 seconds by a competent person. Through fix eyebolts require the same examination, the eyebolt is then reinserted and the back nut torqued to 35Nm.

Once recertification is completed the client is issued with the necessary certification and the Safesite database is updated accordingly.

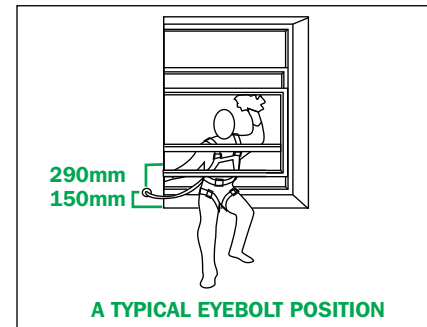
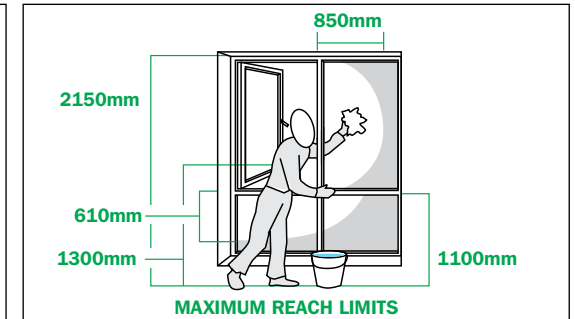
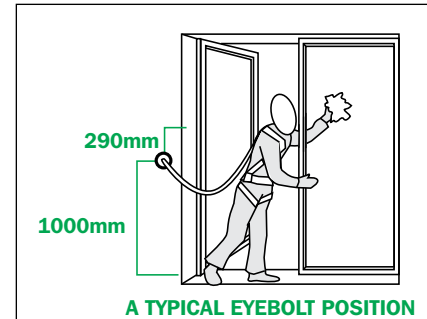




# Anchorage Systems Specifications

## KEE ANCHOR BEAM

Eyebolts cannot always be fitted for structural reasons, for example, dormer windows where the construction is mainly timber or dry lined. In many instances anchorage points are required to carry out short term inspections or maintenance and these very often are not provided. The Kee Anchor Beam is the ideal solution. Annual inspection is required by a competent person.



## KEE ANCHOR BEAM - AT060

The Kee Anchor Beam for one person conforms to EN795 Class B. The anchorage point is fully adjustable (0.35 -1.24m) and can be positioned in door/window reveals. Material : 316 grade stainless steel. Net weight : 6.9kg.





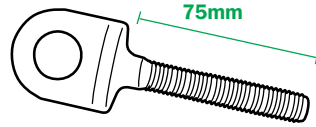


# Anchorage Systems Specifications



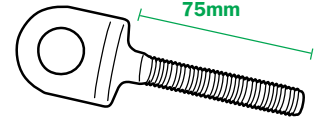
## 75mm GALVANISED EYEBOLT - 5845-75G

Internal/External fitting. Material : Drop forged galvanised finished BS EN ISO 1461  
Net weight : 0.19kg



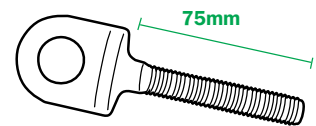
## 75mm STAINLESS STEEL EYEBOLT - 5845-75S

Internal/External fitting. Material : Drop forged Stainless Steel 316 grade finish. Net weight : 0.19kg



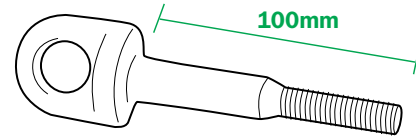
## 75mm POLYESTER COATED EYEBOLT - 5845-75W

Mainly for internal fitting. Material : Drop forged white polyester coated finish BS 6496 : 1984 and BS 6497 : 1984. Net weight : 0.19kg



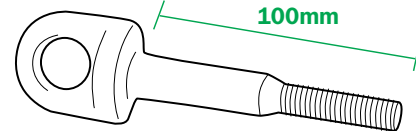
## 100mm GALVANISED EYEBOLT - 5845-100G

Internal/External fitting. Material : Drop forged galvanised finished BS EN ISO 1461  
Net weight : 0.23kg.



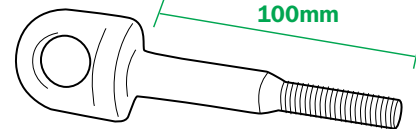
## 100mm STAINLESS STEEL EYEBOLT - 5845-100S

Internal/External fitting. Material : Drop forged Stainless Steel 316 grade finish. Net weight : 0.23kg.



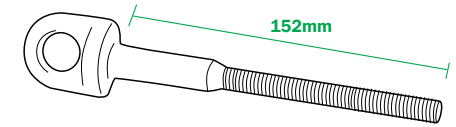
## 100mm POLYESTER COATED EYEBOLT - 5845-100W

Mainly for internal fitting. Material : Drop forged white polyester coated finish BS 6496 : 1984 and BS 6497 : 1984. Net weight : 0.23kg.



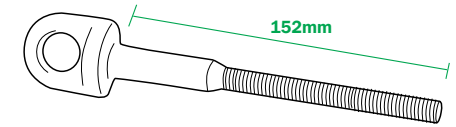
## 152mm GALVANISED EYEBOLT - 5845-152G

Internal/External fitting. Material : Drop forged galvanised finished BS EN ISO 1461  
Net weight : 0.28kg



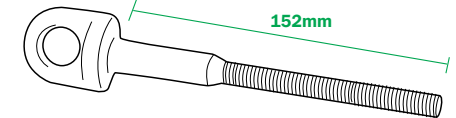
## 152mm STAINLESS STEEL EYEBOLT - 5845-152S

Internal/External fitting. Material : Drop forged Stainless Steel 316 grade finish. Net weight : 0.28kg



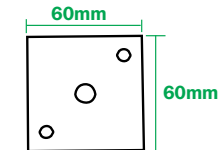
## 152mm POLYESTER COATED EYEBOLT - 5845-152W

Mainly for internal fitting. Material : Drop forged white polyester coated finish BS 6496 : 1984 and BS 6497 : 1984. Net weight : 0.28kg



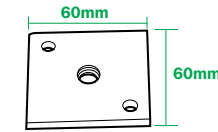
## STAINLESS STEEL BACK PLATE - BPLATESQS

Used on through fix as backing plate. Material : 316 grade Stainless Steel. Net weight : 0.152kg.



## GALVANISED BACK PLATE - BPLATESQG

Used on through fix as backing plate. Material : Galvanised steel to BS EN ISO 146.  
Net weight 0.152kg.

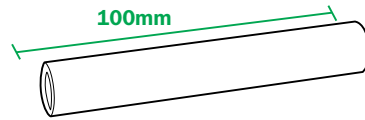


## IDENTIFICATION DISC - PPEDISC-FA

Used with all Fall Arrest Eyebolt installations Fall Restraint (PPEDISC-FR) & Work Positioning (PPEDISC-WP) Discs also available. Material : Plastic. Net weight : 0.003kg.

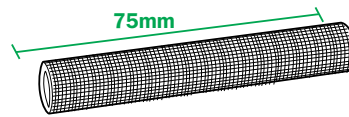
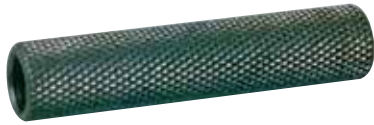


# Anchorage Systems Specifications



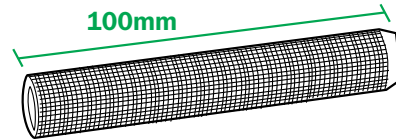
## **CONNECTOR M12 - COUP12X3G**

Used to extend fixings. Outside Dia 16mm. Material : Galvanised steel to BS EN ISO 146. Net weight : 0.08kg.



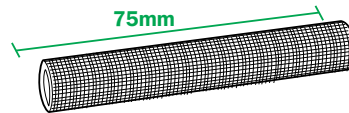
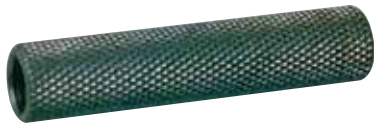
## **KNURLED INSERT - KNURL3MS**

Used on Eyebolt resin fix installations. Material : BZP Net weight : 0.8kg.



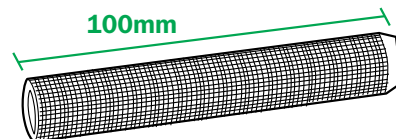
## **KNURLED INSERT - KNURLM12MS**

Used on Eyebolt resin fix installations. Material : BZP Net weight : 0.106kg.



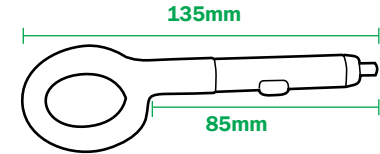
## **KNURLED INSERT - KNURL3SS**

Used on Eyebolt resin fix installations. Material : Stainless steel Net weight : 0.8kg.



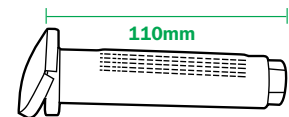
## **KNURLED INSERT - KNURLM12SS**

Used on Eyebolt resin fix installations. Material : Stainless steel Net weight : 0.106kg.



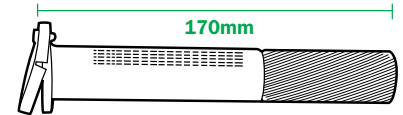
## **KEYANKA EYEBOLT - KEY-KEY**

Quick release mechanism for Eyebolt removal. Material : Stainless Steel 316 Grade. Net weight : 0.16kg



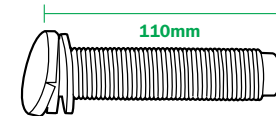
## **KEYANKA CONCRETE SOCKET ASSEMBLY - KEY-CONC**

Insert for concrete where resin fix installation. Material : Stainless Steel 316 Grade. Net weight : 0.335kg



## **KEYANKA BRICKWORK SOCKET ASSEMBLY - KEY-BRICK**

Insert for brick/stone where resin fix installation. Material : Stainless Steel 316 Grade. Net weight : 0.535kg



## **KEYANKA STEELWORK SOCKET ASSEMBLY - KEY-STEEL**

Insert for steelwork. Material : Stainless Steel 316 Grade. Net weight : 0.295kg



## **POLY WASHER - POLYWASH**

Used with all Eyebolt installations. Material : Neoprene. Net weight : 0.002kg.





# Roofanka Specification BS EN 795 Class A2

## PRODUCT SPECIFICATION SLOPE MOUNTED ROOFANKA

### GENERAL

Roofanka® is designed to be used as a fall arrest single anchor point or as a structural anchor for those working on pitched roofs.  
When used for Fall Arrest, Roofanka® serves as a fall arrest anchor, ladder hook and crawling board clamp for the attachment of harnesses and to secure roof ladders, crawling boards, work platforms etc.

### MATERIALS

All components above the roof are 316 Grade stainless and internal components are galvanised steel to BS EN ISO 1461.

### DESIGN

The designed system consists of a stainless steel eyebolt and steel clamping system that utilises the structural members of the roof's construction for support.  
The anchor is manufactured to clamp around the following structural members:- Timber rafter, Angle Purlin, Multibeam B, Multibeam Purlin, Z-Purlin, I-Beam etc.  
Waterproofing is achieved via a piece of lead flashing and the Roofanka® patented weatherproof seal

### DIRECTION OF LOADING

Due to the potential weaknesses in timber roof structures, the basic models (product codes RANKAUK and RANKAEX) should only be used where the direction of loading would always be in the plane (i.e. down the slope) of the roof. Where it is possible that the arrest of a fall may result in forces applied across the roof structure (e.g. by a fall over a gable end), special versions of ROOFANKA should be employed. The addition of a lateral brace shares the bending moment with the adjacent rafter to resist potentially high torsional bending of the roof timbers.  
See product codes RANKAUK-GE and RANKAEX-GE Specification: EN 795 Class A2 and EN 517 Type A, one user only, with a maximum loading of 10kN.

### TESTING

The system is fully tested and compliant with BS EN 795, BS 7883 and ISO 14567.

### ANNUAL RECERTIFICATION

Re-certification is required annually in accordance to BS EN 365.

Product Code	Min. Roof member (mm)	Max. Roof member (mm)	Transverse forces OK?
RANKAUK	72 x 35	152 x 65	NO
RANKAUK-GE	72 x 35	152 x 65	YES
RANKAEX	135 x 65	220 x 120	NO
RANKAEX-GE	135 x 65	220 x 120	YES



### SLOPE MOUNTED ROOFANKA - RANKAUK

Material : All components above the roof are 316 Grade stainless and internal components are galvanised steel to BS EN ISO 1461. Net weight : 5.9kg

# Anchorage Systems Recertification

- Periodic inspections by a competent person are required under Regulation 5 of the Workplace (Health Safety & Welfare) Regulation, BS EN 365 & BS 7883. The frequency will depend upon environment, location and utilisation, but should be at least every 12 months.
- Check the system & configuration still serves the client's needs. Establish if any modifications, additional products are required to reflect any refurbishment or additional plant and equipment that has been installed and requires access.
- At least once every 12 months each anchor device and its structural steelwork should be examined by a competent person.
- Remove the demountable components and thoroughly examine for wear, defects & corrosion.
- Re-assemble all the components if satisfactory.
- After being re-assembled, each structural anchor should be submitted to an axial pull-out force of 6kN to confirm the soundness of the fixing. The structural anchor should sustain the force for a minimum of 15 seconds without deformation.
- Structural anchors that fail the test should be rejected.
- After testing, the structural fabric should be carefully examined for cracking or other signs of failure, and appropriate action taken if necessary. Should the structure fail, the hole should be plugged so preventing re-use and the device relocated in a sound structure.
- Should any given anchorage restrain a fall, then the eyebolt must be removed and discarded, the socket be plugged and a new anchorage fitted in a nearby suitable position.
- Anchorages in buildings which have been subject to fire and high temperature, impact damage or any similar detriment should be renewed.
- Check system plaque position & mark up to reflect date of the next required inspection. Establish if additional plaques are required due to any refurbishment works.

# Safesite Ladder Restraint Specification

## PRODUCT SPECIFICATION

### GENERAL

External window cleaning and general maintenance operations often require the use of ladders as a means of access. Statistically over 50% of accidents involving ladders occur due to ineffective means of securing and where the duration of works is 30 minutes or less. Generally ladders should only be used as a means of access and not as a working platform. It is essential that three points of contact are maintained. Over stretching must be avoided.

### LEGISLATION

The Workplace (Health, Safety and Welfare) Regulations state "Where a ladder over 6m long will be needed, suitable points for tying or fixing the ladder should be provided." Further information concerning access for cleaning is contained within BS 8213 : Part 1: Windows, doors and rooflights

### INSTALLATION

The "J" hooks are resin fixed to the structure at approx 2-4m centres. Where possible they are installed at a height of approx 1.8 - 2.0 metres above the ground. Once installed they are tested to a tensile load of 2.5kN for 15 seconds.

### SYSTEM APPLICATION

Ladder Restraint Straps are reefed around the outer stile of the lower section of the ladder (using the loop in one end of the strap) at a position closest to the "J" hooks. This means that the strap will be as short as possible when attached to the hooks. Straps may be left on the ladder during the working day. The straps are attached to the "J" hooks by means of the strap hooks. Slack is taken out of the strap by pulling excess through the ratchet. The straps are then put into tension via the ratchet device. The system is now ready for use by the operative. For further safety the operative can utilise a harness, non shock absorbing lanyard and karabiner thus providing a work positioning system at the desired height. If hook positions dictate that the ladder must be positioned directly above a single hook then both straps can be linked back to the same hook and the system used as normal. To release the system simply pull the spring loaded clip mounted on the ratchet device and pull through the webbing.

*The diagram shows the recommended height for ladder restraints to be installed (1.8m). The black solid ladder drawing shows the initial position and the two red drawings indicate the next ladder positions all utilising just two ladder restraint "J" hooks installed at 2-4m centres. It is generally recommended that the ladder should be utilised at 75°.*

### MAINTENANCE

Every time the system is used a visual inspection of the straps must be carried out by a competent person to check for wear and abrasion. The "J" hook and surrounding structure should also be inspected for general deterioration by a competent person. There is no legal obligation to pull test the ladder restraint "J" hooks.



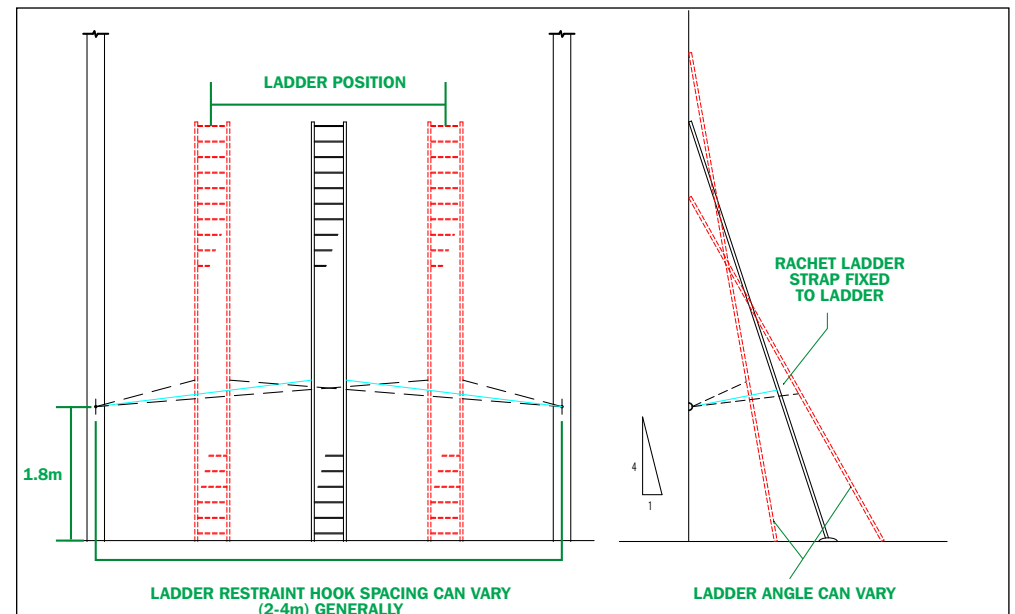
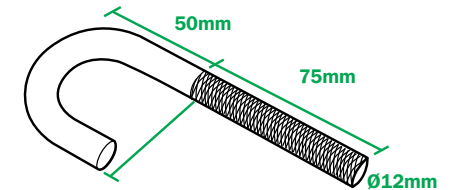
### LADDER RESTRAINT RATCHET AND STRAPS - LR 003(3m)/LR 006(6m)

Ladder Restraint Straps – Nylon Strap manufactured to BS 5759 : 1987. Straps complete with snap hook and ratchet Material : Nylon Strap rated assembly strength 0.25 tonnes. Minimum breaking strength 0.5 tonnes. Net weight : Nylon Strap 0.21kg. Ratchet Strap 0.42kg.



### LADDER RESTRAINT HOOK - LR 001

Material : 316 Grade stainless steel "J" hook. Net weight : 0.1kg.





# Anchorage Systems Recertification

- Although there is no legal obligation to recertify ladder restraints, there is a general requirement under Regulation 5 of the Workplace (Health, Safety and Welfare) Regulations to inspect and record the general condition of the restraint system in order to provide a maintenance schedule that is available for inspection.
- Check the system & configuration still serves the client's needs. Establish if any modifications, additional products are required to reflect any refurbishment or additional plant and equipment that has been installed and requires access.
- It is recommended that each ladder restraint and its structure should be examined at least once every 12 months by a competent person.
- Each structural anchor, after being examined should be submitted to an axial pull-out force of 2.5 kN to confirm the soundness of the fixing. The structural anchor should sustain the force for a minimum of 15 seconds without deformation.
- Structural anchors that fail the test should be rejected.
- After testing, the structural fabric should be carefully examined for cracking or other signs of failure, and appropriate action taken if necessary.
- Should the structure fail, the hole should be plugged so preventing re-use and the device relocated in a sound structure.
- Ladder restraints in buildings which have been subject to fire and high temperature, impact damage or any similar detriment should be renewed.
- Check system plaque position & mark up to reflect date of the next required inspection. Establish if additional plaques are required due to any refurbishment works.

# Personal Fall Protection Systems

## PERSONAL FALL PROTECTION SYSTEMS

Personal fall protection systems are required when an operative is working at an elevated level with an unprotected side or edge, which can be at any height. The system must be designed in such a way to prevent the operative from free falling more than 2m or striking a lower level. There are two ways that a company can accomplish this task: Fall Restraint or Fall Arrest.

## FALL RESTRAINT SYSTEM

This system does exactly what it states. It is designed in such a way as to restrain the user from falling by not allowing the user to get to the leading edge. With this system the free fall distance is ZERO. Belts can be used with this type of system but a full body harness is recommended. If any possibility of a free fall exists then the user needs to use a Fall Arrest system.

## FALL ARREST SYSTEM

A fall arrest system consists of the following components: Anchor, Connector, Body support and Retrieval.

- Anchors need to have a minimum breaking strength of 10kN or be engineered for a specific system and have a safety factor of 2:1.
- Connectors can consist of one of several different means. A positioning lanyard, a deceleration lanyard, a self-retracting lanyard/life line or a climbing aid device.

- Body support is a full body harness. A full body harness distributes the fall impact throughout the body and allows the user to better absorb a fall.
- When working in a fall arrest situation it is a legal requirement for the employer/building owner to have a rescue policy and plan in place and not to rely solely on the emergency services. Anyone responsible for or working at height must be trained fully on correct rescue procedures including how to use the rescue kit provided. Should an emergency occur, a competent first aider should be present to assist with the casualty and to follow the standard UK first aid guidance for the recovery of a person.

## KEY COMPONENTS OF A FALL ARREST SYSTEM

There are a number of issues that need to be addressed when considering using a fall arrest system.

## IMPACT FORCE

The maximum impact force for a full body harness is 6kN and 10kN for the anchorage point. Calculating the impact force is difficult because there are so many variables. These variables include fall distance, person's weight, and attachment method (self retracting life line, shock-absorbing lanyards, etc.).

## EQUIPMENT COMPATIBILITY

It is important that the equipment being used is compatible with one another. The entire system needs to be measured by its weakest link. Conventional locking snap hooks need to be used with compatible D-ring connectors. It is a general recommendation that a user does not mix fall protection equipment from various manufacturers in order to avoid a compatibility issue and to ensure maximum manufacturer guarantee of quality and use.

## FREE FALL DISTANCE

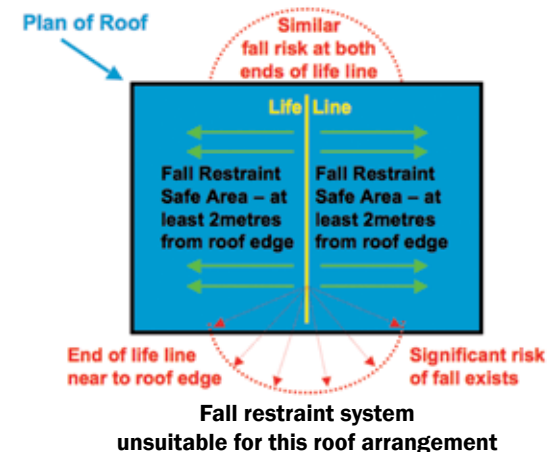
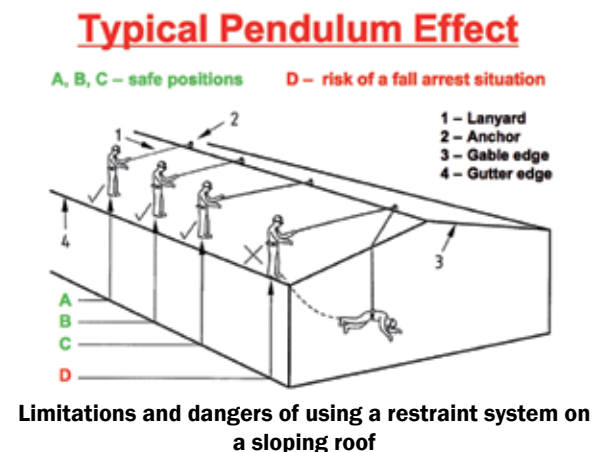
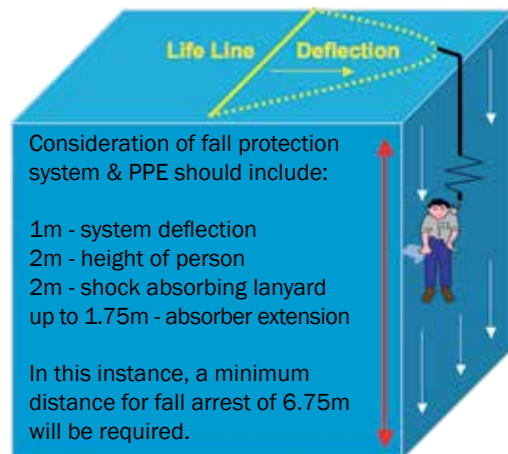
In layman's terms, it is the distance that a person falls before any part of the system starts to arrest the fall. Free fall is measured from the anchorage point to the point in which the system started to arrest the fall. This distance excludes deceleration distance and lanyard/harness elongation. Maximum free fall distance is 2m or striking a lower level.

## TOTAL FALL DISTANCE

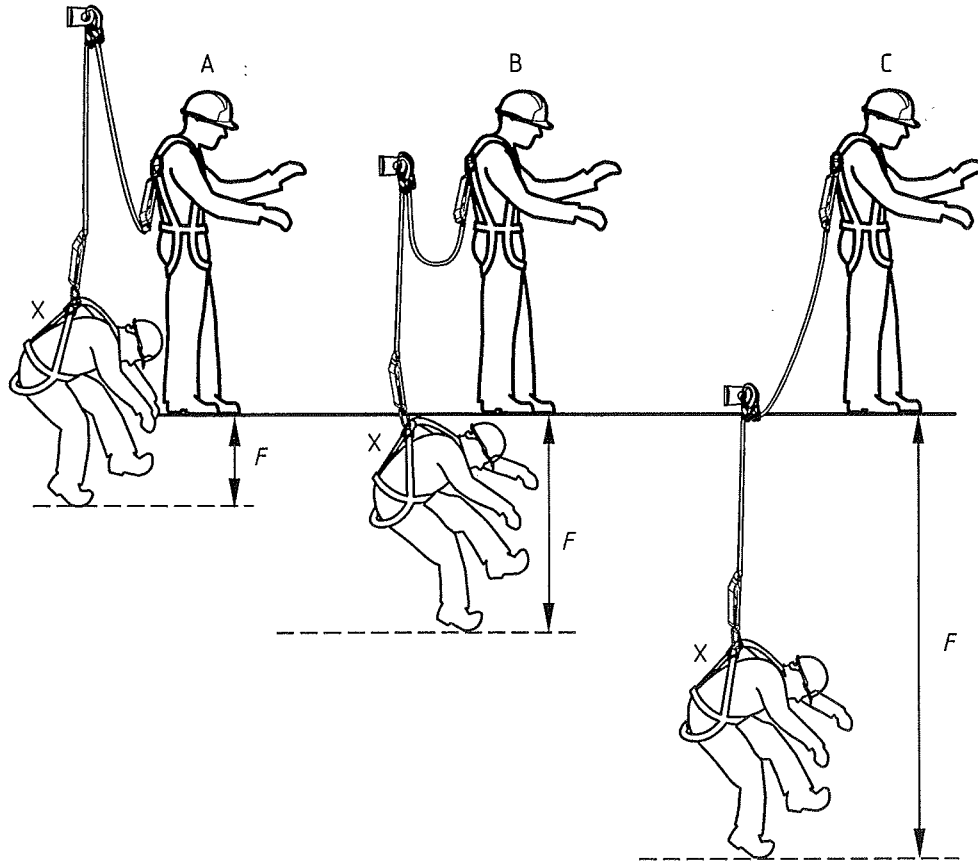
Is measured as the distance the operative fell from the point at which they were standing to the position of their feet after the fall. Free fall and deceleration distances are included in the measure. An example of the 6m rule which shows falling distances can be seen in the diagram.

## ANCHORAGE POINTS

Need to be rated at a minimum of 10kN per person. If engineered, they need to have a 2:1 safety factor.



# Minimum Height Requirements



The above diagram shows three fall arrest situations. In each case the fall arrest system is based on a 1.5m long energy absorbing lanyard and a distance between the attachment point on the user's harness and their feet of 1.5m. The free fall distance is the vertical distance between the position of the user's feet immediately before the fall, and the position of the user's feet at the point at which the lanyard has become taut and started to arrest the fall. (Figure F in the diagram)







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