Work at Height on Construction Hoists

CPA Best Practice Guide

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Working in Partnership

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Foreword

The Construction Plant-hire Association (CPA) has, for many years, been in the vanguard of plant safety. This *CPA Best Practice Guide on Work at Height on Construction Hoists* is one of a number of guidance documents which confirm the Association's continued and dedicated commitment to safety and training.

In recent years, particularly since the implementation of the Work at Height Regulations in 2005, there has been significant emphasis on the need to prevent falls from height in the workplace. In the period 2007 to 2008 there were 34 fatalities and 938 major injuries due to falls from height in the construction industry alone.

This document's aim is to provide guidance on work at height during the erection, safe use, maintenance, dismantling and thorough examination of construction hoists. It sets out in readily understandable terms the steps that both the owner and user of a construction hoist need to take to ensure that personnel can work safely at height on the hoist installation, including advice on the training of personnel and further sources of information.

This CPA Best Practice Guide has been produced by a very experienced team of people with an in-depth knowledge of construction hoists, who understand the practical issues of erecting, dismantling, maintaining and using them on sites. The work has been carried out by a Working Group drawn from members of the CPA's Construction Hoist Interest Group, in partnership with specialist inspectors from the Health and Safety Executive.

On behalf of the CPA I would like to thank the members of the Working Group for all the time and effort they have spent on producing this document.

Gordon Gedling
Chairman
Construction Hoist Interest Group
Construction Plant-hire Association.

1.0 Introduction

Working at height is an inevitable part of the erection, alteration, maintenance and dismantling of construction hoists and should be carried out by trained personnel, following careful planning which includes adequate assessment of the risks involved. This planning should, where necessary, include provision for the rescue of persons, both during erection, alteration and dismantling, and whilst the hoist is in-service. This document provides guidance on the issues involved.

Health and Safety legislation requires that safe systems of work are in place for all work activities and the particular references for the requirement to provide safe access and a means of safe rescue are:-

- Health and Safety at Work etc. Act 1974. - Sections 2 & 3
- Work at Height Regulations 2005
- Provision and Use of Work Equipment Regulations (PUWER) 1998 – Regulation 17
- Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 – Regulation 3
- Management of Health and Safety Regulations 1999 – Regulation 3
- Construction Design and Management Regulations 2007

Work at Height whilst loading and unloading hoist components on vehicles is covered by the CPA publication:-

- *Working at Height Whilst Loading and Unloading Transport.*

2.0 Definitions

2.1 work at height (from the Work at Height Regulations)

"work at height" means -

(a) work in any place, including a place at or below ground level;

(b) obtaining access to or egress from such place while at work, except by a staircase in a permanent workplace,

where, if measures required by these Regulations were not taken, a person could fall a distance liable to cause personal injury

2.2 collective measures

measures which collectively protect one or more people from falling (e.g. guardrails) or mitigate the effects of a fall (e.g. airbags or nets)

2.3 personal measures

measures which protect an individual from falling or mitigate the effects of a fall (e.g. personal work restraint or fall arrest systems)

2.4 personal fall protection system

a system to be used by an individual in the workplace to prevent and/or to arrest falls from a height.

2.4.1 fall arrest system

a personal fall protection system which uses a body holding device (harness) connected to a reliable anchor to arrest and restrict a fall so as to prevent the collision of the user with the ground or structure whilst limiting the forces on the body

2.4.2 work restraint system

a personal protective system which uses a body holding device (harness) connected to a reliable anchor to prevent a person from reaching zones where the risk of a fall exists

2.4.3 work positioning system

a personal fall protection system which normally includes a body holding device (harness) connected to reliable anchor to support the user in tension or suspension in such a way that a fall is prevented or restricted

2.5 in-service

condition of a hoist which has been handed over to the user and in which the cage or platform (laden or unladen) is in a position other than at the lowest landing level, or in which the cage or platform is at the lowest landing level and laden

2.6 out-of-service

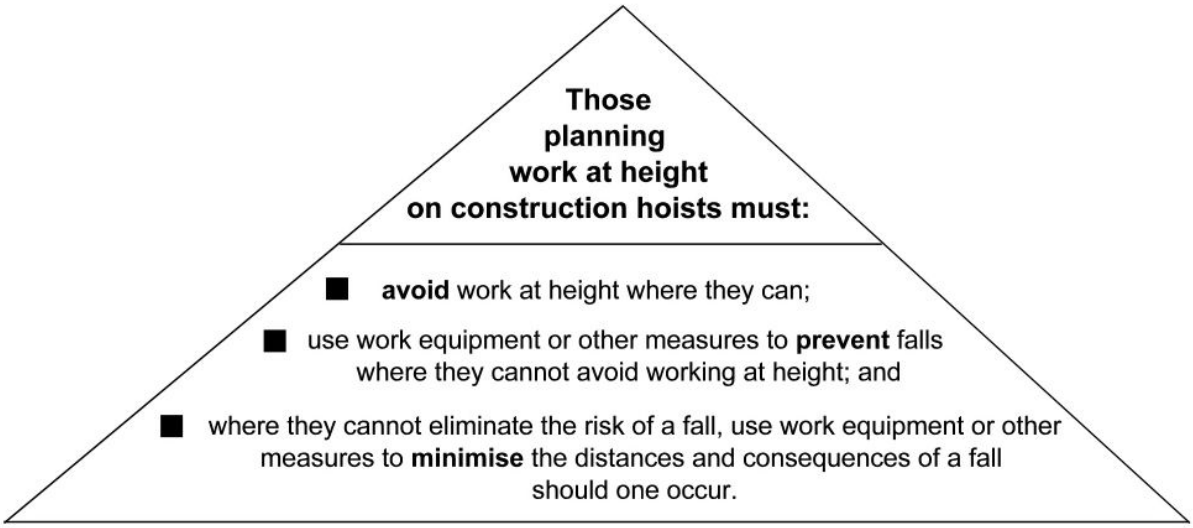
condition of a hoist which is under the control of the supplier for the purposes of erection, alteration, maintenance or thorough examination

2.7 mobile elevating work platform (MEWP)

mobile machine which consists, as a minimum, of a work platform with controls, an extending structure and a chassis; that is intended for work at height

3.0 Hierarchy For Work at Height

The *Work at Height Regulations 2005* set out a hierarchy of fall protection measures to be taken when planning work at height



- Avoid work at height wherever possible and actively seek solutions to facilitate this;
- If this is not possible, use “collective” means of prevention such as guardrails;
- If this is not possible, use “personal” means of prevention such as work restraint;
- If this is not possible, use “collective” means of protection such as air bags;
- If this is not possible, use a personal fall protection system such as a work positioning system or fall arrest system;
- Additionally provide training and instruction and take other measures to prevent any person falling a distance liable to cause personal injury.

As a primary aim, all tasks associated with work at height on hoists should be reviewed to see if they can be fully or partially completed off site or at ground level.

If, when working on hoist erection, alteration, dismantling and maintenance it is not possible to avoid all work at height, collective or personal fall protection measures may need to be implemented. See **Section 7.**

4.0 Circumstances Requiring Work at Height

The following table summarises the main activities and associated tasks requiring both access and work at height.

Activity	Person Working at Height	Task
Erection, Alteration, & Dismantle Out of Service	Erector	Loading and unloading from transport, connecting and releasing lifting slings
		Erecting and removal of handrails on Passenger/Goods (P/G) cage roofs
		Fitting and removal of top drive units which form part of the cage handrails
		Access to P/G base from roof of cage for installation and removal of buffer springs and holding down bolts
		Installing and dismantling mast sections and fitting and removal of connection bolts
		Installing and dismantling mast ties and fitting and removal of connection bolts
		Attachment and removal of mast section lifting slings
		Fitting and removal of hoist superstructure (tie and gate support system)
		Fitting, removal and setting travel limit switches and ramps
		Fitting and removal of power and control cable system components (e.g. cables, trolleys, rails, guides, drums etc.)
		Accessing scaffold or building façade from the hoist (also applies to cages of twin hoists)
		Fitting and removal of counterweight system components
		Fitting and removal of catheads and ropes on rope driven hoists
	Erector/Others	Fitting and removal of hoist-way protection (i.e. landing gates, ramps etc)
Operation In-Service	Operator of P/G hoist	Access to cage roof in the event of a power failure to carry out manual descent
	Passengers in cage of P/G hoist	Emergency evacuation in case of power failure or safety gear activating
	Maintenance Personnel/Hoist Operator/Passengers	Accessing scaffold or building façade from the hoist (also applies to cages of twin hoists)
	Maintenance Personnel	Access to cage (both Goods and P/G) in the event of activation of the safety gear
Maintenance & Thorough Examination Out-of-Service	Maintenance personnel Competent Person	Access to all areas of the hoist structure, scaffold or building facade as for erection, alteration and dismantle

5.0 Responsibility for Planning of Work at Height and Provision of Rescue Resources

It is clear that the primary duty for ensuring that work at height on a hoist installation is effectively planned and that there are adequate resources for carrying out rescue of persons from height, rests with the organization in control of the premises on which any hoist is sited. In the case of a construction site this will be the Principal Contactor as defined by the *Construction (Design and Management) Regulations 2007*. They in turn will assess the competence of all sub-contractors and ensure that they are provided with the information about the project that they need to enable them to carry out their work safely and without risk to health.

In practice it is likely that:-

1. Arrangements for work at height during erection, alteration and dismantling will be agreed between the hoist supplier and the Principal Contractor;

2. Arrangements for rescue, if required, during erection, alteration and dismantling will be agreed between the hoist supplier and the Principal Contractor;

3. Arrangements for rescue during use will be made by the Principal Contractor, who may seek advice from the hoist supplier, including machine specific familiarization for operators;

4. Arrangements for work at height during maintenance and thorough examination will be agreed between the hoist supplier and the Principal Contractor;

5. Arrangements for rescue, if required, during maintenance and thorough examination will be agreed between the hoist supplier and the Principal Contractor.

Note: *It is vital that there is effective communication between all parties involved.*

6.0 Planning

In carrying out both work at height and rescue from height, as with all activities in the workplace, employers must ensure that a safe system of work is in place. Adequate planning is a vital part of establishing the safe system of work and must involve full consultation between the Principal Contractor and sub-contractors. Planning will involve the following stages relating directly to work at height (See **Sections 3.0** and **4.0**):-

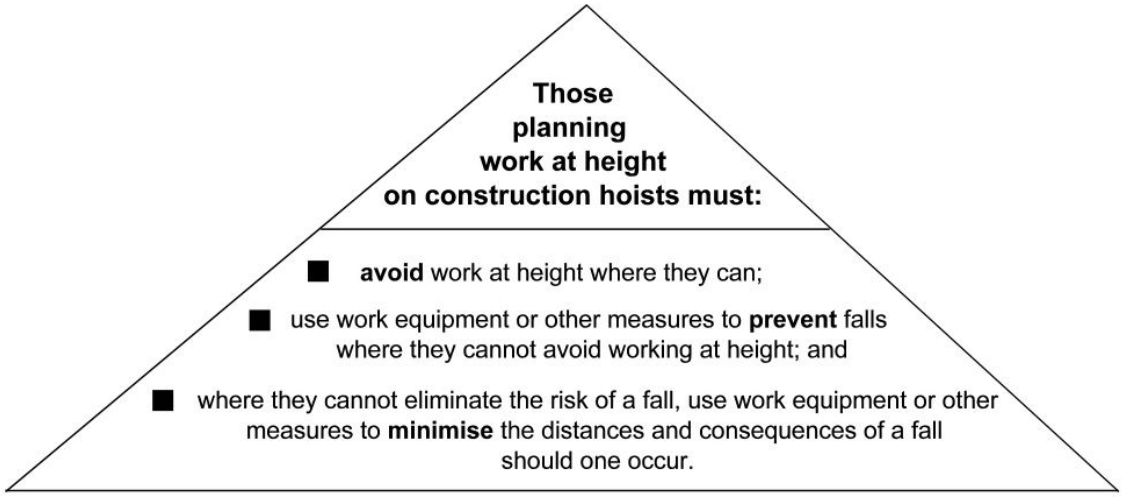
- Identify the task to be undertaken and by whom;
- Identify the hazards associated with the task;
- Carry out a risk assessment;
- Identify control measures;
- Select appropriate equipment;
- Develop the method to be used;
- Record the outcome of the planning in a Method Statement;
- Communicate the plan to all persons involved;
- Review the plan whenever circumstances change and at appropriate intervals;
- This safe system of work should form part of the overall planning for hoist erection, alteration, dismantling and operation.

The control measures identified should include arrangements for training of personnel and the provision, inspection and maintenance of collective fall prevention measures, PPE and, where required, rescue equipment.

In addition to onsite rescue, planning for rescue should include the involvement of the emergency services, who should be consulted by the Principal Contractor as part of their total site rescue planning process.

7.0 Guidance for Work at Height

The *Work at Height Regulations 2005* set out a hierarchy of fall protection measures to be taken when planning work at height



- Avoid work at height wherever possible and actively seek solutions to facilitate this;
- If this is not possible, use “collective” means of prevention such as guardrails;
- If this is not possible, use “personal” means of prevention such as work restraint;
- If this is not possible, use “collective” means of protection such as air bags;
- If this is not possible, use a personal fall protection system such as a work positioning system or fall arrest system;
- Additionally provide training and instruction (See **Section 11**.) and take other measures to prevent any person falling a distance liable to cause personal injury.

7.1 Elimination of work at height

As a primary aim, all tasks associated with work at height on hoists should be reviewed to see if they can be fully or partially completed off site or at ground level. Manufacturers should be encouraged to ensure that new designs of hoist are developed to reduce the need for work at height to a minimum.

Examples of measures that can be taken before delivery of components to site are:-

- Checking condition of mast sections;
- Assembly of base mast sections and drive frames;
- Pre assembly of components to reduce the number of lifts such as the bolting of mast sections together for installation with a mobile or tower crane;
- Assembly of advertising signs before delivery to site;
- Arranging correct length of trailing cable before delivery to site;
- Inspection and testing of components and assemblies before dispatch to site including;-
    - Safety brake test;
    - Control system test;
    - Motor tests;

- Running test (gearbox etc);
- Brake test;
- Roller condition and adjustment;
- Drive pinion condition and adjustment;
- Gate/enclosure interlock test and inspection.

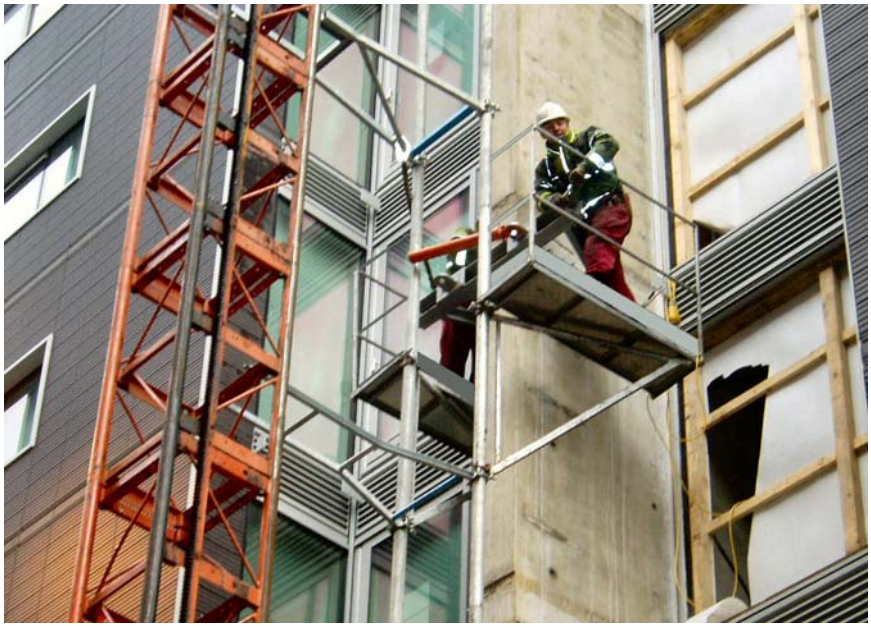
Where work at height cannot be eliminated the following hierarchy should be employed:-

7.2 Collective Fall Prevention Measures

Collective fall prevention measures should be adopted wherever possible, as they enable personnel to work with maximum freedom and provide effective protection against falling of both persons and objects. Measures, such as guard rails, are often used on roofs of passenger goods cages. These however present the problem that erection personnel may have to work at height, without edge protection, to assemble them in the first place. On some hoists, manufacturers also provide steps and working platforms with guardrails to give protected access to areas such as mast bolts, tie tube connections and limit switches.

Typical Working Platforms

When purchasing new hoists, consideration should be given to the collective measures provided by the manufacturers as part of the evaluation process. Manufacturers should be strongly encouraged to incorporate collective measures into new designs of hoist to enable erection to be carried out safely, with a minimal need for the use of personal fall protection systems. Where personal fall protection systems are required, manufacturers should be encouraged to provide and designate suitable & sufficient anchor points to which lanyards etc. can be fastened.



Typical Mast Tie Access Platforms

Consideration should also be given to carrying out work at height on the hoist installation from areas of the adjacent structure with edge protection.

MEWPs are often used for work at height and provide a versatile means of collective protection against falls; however they only have limited application for work on hoists due to the height of most hoist installations, restricted access at the base of the hoist and the limited rated capacity of MEWPs.

Detailed guidance on the safe use of MEWPs is given in:-

- BS8460:2005 – *Safe use of MEWPs – Code of practice.*
- HSE Information Sheet CIS 58 - *The selection and management of mobile elevating work platforms.*

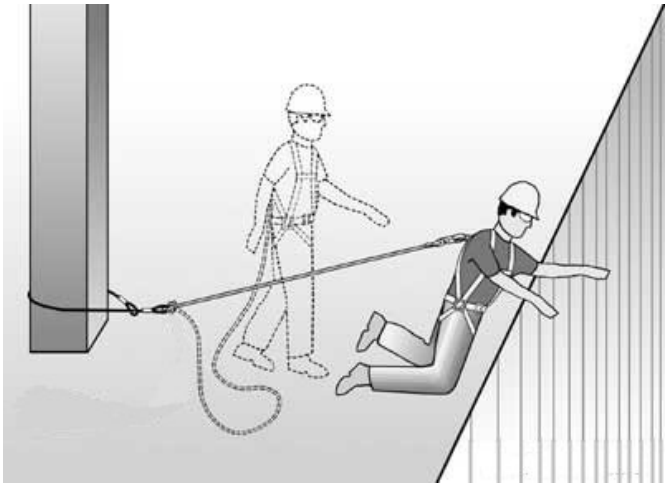
7.3 Personal Fall Prevention

Where it is not possible to provide collective fall prevention when accessing hoist structures, work will have to be carried out using personal fall prevention equipment. This will normally fall into one of two types:-

- Work restraint systems
- Work positioning systems

7.3.1 Work restraint systems

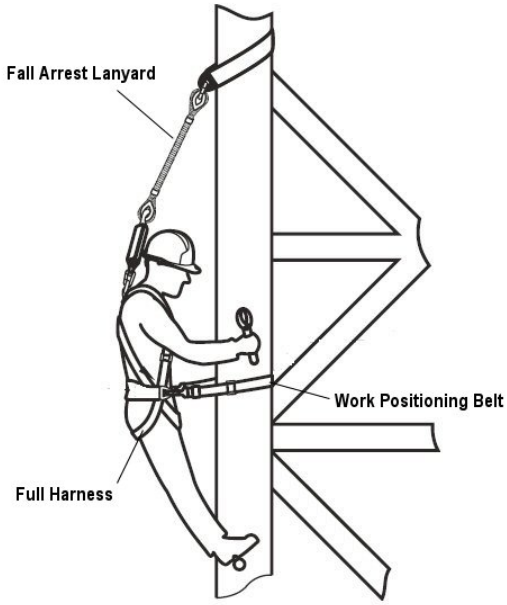
Work restraint systems will prevent personnel from reaching an unprotected edge and falling. By definition they restrain the wearer by restricting movement and prevent them from reaching a position from which they can fall. This has the advantage of removing the risk of suspension trauma.



Restraint Systems

7.3.2 Work positioning systems

Work positioning systems can provide full or partial support to personnel and prevent them from falling whilst carrying out tasks in one location. They allow the wearer to work safely outside the confines of the cage guard rails with both hands. Work positioning systems used on hoist installations should always be combined with a fall arrest system to provide protection at the location where the work positioning system will be used. The fall arrest system will provide protection whilst the wearer is moving to, and from the location where the work positioning system will be used.



Work Positioning Systems

7.4 Collective Fall Arrest

There are a number of proprietary collective fall arrest systems, such as nets or airbags on the market. These should be carefully evaluated to ensure that they are appropriate and effective solutions for the particular issues associated with working at height on construction hoists.

Airbag

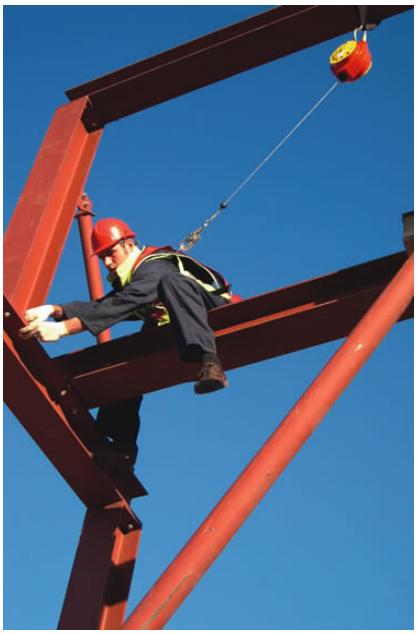
Safety Net

7.5 Personal Fall Arrest

If it is not possible or appropriate to use collective or personal fall prevention or collective fall arrest systems, personal fall arrest systems should be used to mitigate the effects of any fall.

Fall arrest systems will reduce the consequences of a fall where the wearer is working outside a protected edge, such as the confines of any guardrails. A two lanyard system will allow movement around a structure. When fall arrest systems are used, a vital part of the planning process is consideration of arrangements for the rescue of persons suspended in the fall arrest system after a fall.

Suspension trauma can occur even if a person has only been suspended at height for a short period of time, particularly if they are motionless (See **Section 9.1**).

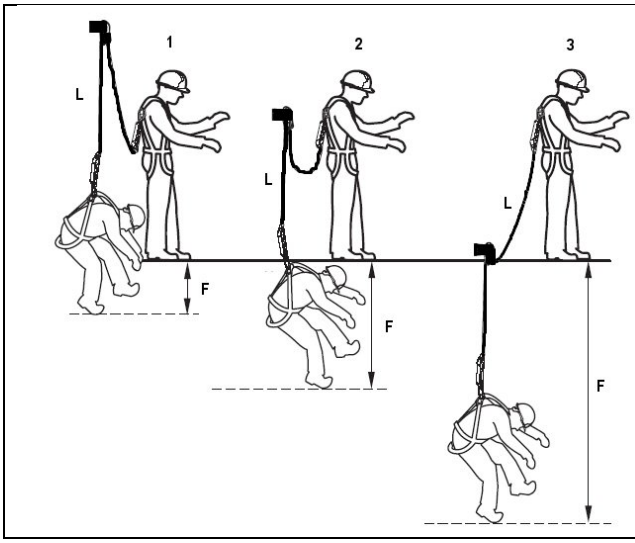


Fall Arrest Systems

When using fall arrest systems it is important that the anchor point is as high as possible to ensure that the “fall factor” which provides an indication of the length and severity of a fall is kept as low as possible. The fall factor is calculated by dividing the free fall distance by the length of lanyard available to arrest the fall (before any energy absorbing device has been deployed).

Reducing fall factors is vital where personnel using fall arrest systems are working at low heights above the ground, as is often the case with transport vehicles. ***If an anchor point is level with the feet of the wearer the minimum free space required above the ground with a 1.5m energy absorbing lanyard is 5.75m, according to Table F1 of BS 8437.***

Further information on “fall factors” is given in Clause 9.1.3.1 of BS 8437:2005 - *Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace.*



1	Anchor point above user's head
	L = 1.5 m lanyard
	Free fall distance F = 0.5m
	Fall Factor = F/L = 0.3
2	Anchor point at shoulder level
	L = 1.5 m lanyard
	Free fall distance F = 1.5m
	Fall Factor = F/L = 1.0
3	Anchor point at foot level
	L = 1.5 m lanyard
	Free fall distance F = 3.0m
	Fall Factor = F/L = 2

Examples of Fall Factors

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7.6 Anchor points

All personal fall protection systems require connection to an anchor point. It is essential that all anchor points have an adequate margin of strength and stability to withstand the dynamic and static forces that could be applied to them in service. Anchor points for fall arrest systems will require a greater capacity than those for work restraint or work positioning systems. Manufacturers should be consulted on the designation of suitable & sufficient anchor points.

Single person anchor points for fall arrest systems should be designed to resist a minimum static force of 12kN. This includes a safety factor of two to allow for the dynamic and static forces that could be applied to them in service. If two or more users are to be connected to the same anchor the minimum static strength of the anchor should be increased to 14kN for two person use and 16kN for three person use.

Specifications for the installation and testing of anchors are given in BS 7883:1997 - *Code of practice for application and use of anchor devices conforming to* BS EN 795*.*

With all types of personal fall protection equipment it is essential that the following points are considered during planning for work at height:-

- Correct equipment for the application is selected;
- Personnel are trained and assessed as competent in the correct adjustment, use, care and recorded checking of fall protection equipment;
- Suitable anchor points on the structure are identified (See **Annex 3**);
- Arrangements are made for the inspection and maintenance of the equipment.

Some basic advice on the selection of personal fall protection systems is given in **Annex 4.** whilst additional detailed guidance is given in

- BS 8437:2005 - *Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace.*
- BS EN 795:1997 - *Protection against falls from a height — Anchor devices — Requirements and testing.*

7.7 Ladders

The basic configuration of construction hoists means that it may not be possible to provide means of access with collective fall protection to parts of the hoist installation,. Consequently fixed and portable ladders are sometimes used.

The view of the Health and Safety Executive is that ladders should only be used for low-risk, short-duration work. Short duration is defined as *"in one position for a maximum of 15 to 30 minutes".* The HSE also state that "*When climbing or working from a ladder, three points of contact should be maintained. (Three points of contact means both feet and one hand in contact with the ladder or stepladder.)"*

Where portable ladders are used they should be of sound construction, with a broad base and fixed to provide effective restraint against slipping. Research has shown that "footing" of ladders by a second person is of limited value. Where personnel are transferring from a ladder to the crane structure there must be sufficient projection of the ladder (at least 1m) beyond the landing level to provide adequate handholds during transfer.

Personnel using ladders must be adequately trained in the selection, use and pre-use checking of ladders. See **Sections 11 and 13.**

Additional guidance is given in the following HSE publications:-

- INDG402 - *Safe use of ladders and stepladders: An employers' guide.*
- INDG403 - *A toolbox talk on leaning ladder and stepladder safety.*
- INDG405 - *Top tips for ladder safety(Pocket Card).*

7.8 Zoning of Accessible Areas

When planning for work at height on hoists it is helpful to divide the accessible areas on the hoist into zones as follows to allow common control measures to be designated for each zone :-

- Zone 1 – Areas with adequate edge protection and no mechanical or entrapment hazards such as inside the cage of a passenger goods hoist or on a completed landing;
- Zone 2 – Areas with adequate edge protection but with mechanical or entrapment hazards such as the platform of a goods hoist or the roof of a passenger goods hoist;
- Zone 3 – Areas without adequate edge protection where access requires the use of fall protection equipment.

Should operation of the hoist motions be required whilst personnel are carrying out assembly or maintenance work in these areas, a safe system of work must be put in place whereby the controls are only operated in response to instructions from the person in charge of the work.

It is important to ensure that collective and personal measures which are implemented to control or mitigate the hazards associated with work at height do not create additional hazards. Suitable and sufficient risk assessments, evaluating any risks associated with the use of fall protection measures should be carried out before implementing such measures.

8.0 Circumstances Requiring Rescue From Height

The following table summarises the activities during which persons may require rescue from height, the persons who may require rescue and the types of emergency that may precipitate the need for rescue. It should be noted that the provision of collective means of fall prevention will remove the need for the rescue of suspended persons.

Activity	Person Requiring Rescue	Type of Emergency
Erection, Alteration & Dismantle Out of Service	Erector	Suspension from fall arrest system
		Injury
		Medical crisis
P/G hoist in use In Service	Operator and passengers	Mechanical or power failure
		Safety gear firing
		Injury
		Medical crisis
Maintenance & Thorough Examination Out of Service	Maintenance personnel Competent Person	Suspension from fall arrest system
		Injury
		Medical crisis

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9.0 Guidance for Rescue From Height

Section 8 identifies three distinct activities where rescue from height may be required. Typical methods and items for consideration in the planning for each of these situations are as follows:-

9.1 Recovery from suspension during erection, alteration and dismantling

A person suspended in a harness may frequently be rescued by moving the hoist cage down to the person or utilising the erection crane to raise the suspended person. Where a suitable crane is available on site a “man riding” basket can provide a quick and effective means of rescue. Man riding lifting operations must be planned effectively. BS 7121-1 *Code of practice for the safe use of cranes,* provides detailed guidance in Clause **23.1**.

An alternative is the use of a suitable rescue system such as the Spanset “Gotcha” system may be used in this situation. This system is contained in a bag, taken up the hoist by the erection team and kept there whenever fall arrest systems are in use. In the event of a person falling and being suspended in the fall arrest system his colleagues will attach a block and tackle to the hoist structure and clip one end of the fibre rescue rope to the casualty’s harness ring using the telescoping pole provided. The casualty can then be raised back up to the hoist structure or lowered to the ground (after the casualty’s harness lanyard has been severed). Details of the Gotcha system are attached at **Annex 2**.

The Gotcha system is always operated by members of the erection team who have been trained by the system manufacturer.

In planning for rescue from height, reliance should not be placed on the use of the Emergency services without first consulting those services.

Suspension in a harness for a period of time (often as little as ten minutes) without moving may give rise to “suspension trauma” which leads to pooling of blood in the veins of the lower limbs. This can cause disturbance to the circulatory system leading to damage of the vital organs. When rescuing a suspended person care must be taken to avoid moving them into a horizontal position as this can cause a massive flow of venous blood to the heart, which cannot cope, and this can cause potentially fatal cardiac abnormalities.

Before a rescue from height is carried out the ambulance service should be summoned to provide expert medical assistance when the person has been recovered.

Additional information on suspension trauma is given in:-

Annex D of BS 8437:2005 - *Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace.*

9.2 When passenger/goods hoists are in use

When passenger/goods hoists are in use the operator and passengers may be stranded in the cage between landings in the event of a power failure, breakdown or the safety gear firing. In the case of power failure and some breakdowns it is often possible for the operator to release the drive motor brakes manually and allow the cage to descend to the next landing level under gravity. If however the safety gear fires, maintenance personnel will have to access the hoist cage, normally via the roof, to reset the safety gear and lower the cage to the next landing. Careful consideration should be given to a safe means of access for the maintenance personnel. This will generally have to be planned on a site specific basis.

If the cage cannot be lowered within a reasonable period of time arrangements will have to be made to safely transfer the operator and any passengers onto the adjacent structure. In this situation the safest option is to remain inside the hoist cage until a safe escape route can be put in place. Planning should ensure that all personnel travelling in the cage of a P/G hoist are made aware of this and forbidden from exiting the cage until authorised to do so.

9.3 During maintenance and thorough examination of the hoist installation

In this situation the method described in **9.1** can also be used, it does however rely on having a second trained person on site at all time whilst fall arrest systems are being used (See **5.5**). This means that lone working during maintenance can only be undertaken where there is no risk of falling and the consequent need for rescue.

9.4 Injury or Medical Crisis

In this situation the injured person should be taken in the hoist, using the normal hoist controls, to a suitable level where first aid can be administered.

10.0 Method Statements

The outcome of the planning process for both work at height and rescue from height on hoists should be recorded in a method statement, which should be specific for the type, model and location of each hoist. Generic risk assessments and method statements will require supplementing by site specific documents as risks and measures to control those risks will vary from location to location.

10.1 Work at height on hoists

Details of the planning for work at height recorded in a method statement should include:-

- Details of working procedures;
- Details of any personal fall protection equipment to be used;
- Configuration of the equipment for different types of access;
- Identification of anchor points on the hoist structure;
- Limitation of the plan for adverse weather such as high winds.

10.2 Rescue from height

Details of the rescue plan should be recorded in a method statement which should be specific for each type and model of hoist. The plan should include:-

- Details of the rescue equipment to be used;
- Configuration of the equipment for different types of rescue;
- Identification of anchor points on the hoist for each type of planned rescue;
- Limitation of the plan for adverse weather such as high winds.

The method statement should be used to train and brief persons who will be working at height and involved in the rescue plan.

A typical method statement is shown in **Annex 5.**

11.0 Training of Personnel

All personnel working at height on hoist erection, alteration, maintenance, thorough examination and dismantling will require training in safe working techniques and the correct use of personal fall protection systems. This training should include assessment of competence.

Additional training is required for personnel carrying out the rescue of persons.

11.1 Safe working at height training

It is essential that all personnel required to work at height on hoists are trained and assessed as competent to work safely at height. This training will cover:-

- Safe working practices;
- Selection and use of personal fall protection equipment;
- Pre-use inspection of personal fall protection equipment;
- Task specific work methods on the range of hoists on which work at height will be undertaken.

Initial training should be carried out by the supplier of the fall protection system to be used or by in-house trainers who have been trained and assessed by the system supplier. Trainees should be assessed for competence by carrying out erection and maintenance tasks on a hoist installation.

It is recommended that refresher training is carried out at six monthly intervals, normally by use of “toolbox talks”, followed by assessment of competence by carrying out typical tasks at height on a hoist installation.

It is important that trainees are not exposed to additional risk whilst carrying out tasks during training. Before beginning training the training organisation should carry out a thorough risk assessment and put in place any necessary control measures such as a back up secondary safety rope.

11.2 Rescue from height training

It is essential that all rescue from height on hoist installation is carried out by trained and competent personnel who should be available on site at all times when rescue may be required.

Initial training should be carried out by the supplier of the system to be used or by in-house trainers who have been trained and assessed by the system supplier. Trainees should be assessed for competence by carrying out a simulated rescue on site.

It is recommended that refresher training is carried out at 6 monthly intervals, followed by assessment of competence by carrying out a simulated rescue.

It is important that trainees are not exposed to additional risk during any simulated rescue carried out during training. Before beginning training the training organisation should carry out a thorough risk assessment and put in place any necessary control measures such as a back-up secondary safety rope.

Additional guidance on training is given in:-

- BS 8454:2006 - *Code of practice for delivery of training and education for work at height and rescue.*
- OC 282/31 – *Rope evacuation from mechanical handling equipment.*
  (HSE Operational Circular available on http://www.hse.gov.uk/lau/lacs/20-3.htm)

12.0 Inspection and Maintenance of Personal Fall Protection and Rescue Equipment

All equipment used for personal fall protection and the rescue of persons from height on hoists must have a pre-use check (visual and tactile inspection) before each use. The check should be carried out in accordance with the manufacturer's instructions. Damaged equipment should be taken out of service immediately. The checks should include any tensioned horizontal safety lines.

In addition to pre-use checks, BS 8437 recommends that equipment should be subjected to detailed inspections by a competent person before first use and at intervals not exceeding six months, and after circumstances liable to jeopardize safety have occurred. Damaged equipment should be taken out of service immediately.

BS 8437 also recommends that interim inspections of personal fall protection equipment are carried out over and above the pre-use checks and the detailed inspections, at intervals determined by the risk assessment carried out at the beginning of the job. In determining what is a suitable interval, factors such as whether items are subject to high levels of wear and tear or contamination should be considered. Certain items of personal fall protection equipment for rescue purposes may be supplied by the manufacturer in sealed transparent packaging. Provided that the seal is not broken, these items do not require interim inspections, however after a specified period (often three years) they must be returned to the manufacturer for inspection and resealing.

Both the detailed inspections and the interim inspections should be recorded.

Equipment should be kept clean and dry and should be properly stored. Wet equipment should be thoroughly dried before storage. Equipment should not be altered or repaired, unless this has been authorized by the manufacturer.

The frequency of detailed inspection should be reviewed by a competent person to take account of storage conditions and any damage found at pre-use and detailed inspections.

Employers should make adequate provision to ensure that employees are following the above requirements.

Inspection Type	Maximum Interval
Pre-use	Before each use
Interim	By risk assessment
Detailed	Before first use Three months (arduous conditions) Six months (normal use)

Additional guidance is given in:-

- BS 8437:2005 - *Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace.*
- INDG 367 – *Inspecting fall arrest equipment made from webbing or rope.*
  (HSE free leaflet available on http://www.hse.gov.uk/pubns/indg367.pdf)

13.0 Inspection and Maintenance of Access, Egress and Other Equipment

All areas used for access and egress on construction hoists should be checked by the user before use to ensure that they are secure, undamaged and well maintained, as mud and other agents may cause slips and trips. Any defects found must be immediately reported to the user's supervisor. These areas should also be included in maintenance inspections and thorough examinations.

Equipment used for access, egress or work at height on construction hoists must have a pre-use check (visual inspection) before each use. The check should be carried out in accordance with the manufacturer's instructions. Damaged equipment should be taken out of service immediately and the defects reported to the user's supervisor.

In addition to pre-use checks, equipment should be subjected to detailed inspections by a competent person before first use and at intervals not exceeding six months, and after circumstances liable to jeopardize safety have occurred. Damaged equipment should be taken out of service immediately and the removal from service recorded.

14.0 Lone Working

Lone working should be avoided at all times by suitable liaison with the person in control of the site, to ensure that site personnel are always in attendance during installation, maintenance and thorough examination of construction hoists.

If lone working is unavoidable, the planning process for work at height on construction hoists must take into account the particular hazards of lone working and suitable measures should be put in place to minimise risks to the lone worker. These might include:-

- Call in arrangements;
- Notification to a remote supervisor of entry and exit to premises;
- Provision of alarm and tracking systems.

Additional advice on lone working is given in:-

- INDG 73 - *Working alone in safety.*

Annex 1 - Personal Fall Protection and Rescue System Manufacturers

Company	Address	Website	Telephone
Capital Safety	Capital Safety Group (Northern Europe) Ltd Unit 7 Christleton Court, Manor Park Runcorn Cheshire WA7 1ST	www.csgne.co.uk	01928 571324
Heightec	Heightec Ltd LDBP Mintbridge Road Kendal Cumbria LA9 6NH	www.heightec.com	01539 728866
Heightworks	Heightworks Ltd 11 Rydal Close Hednesford Staffordshire WS12 4RP	www.heightworks.com	07812 206265
Spanset	SpanSet (UK) Limited Telford Way MIDDLEWICH Cheshire CW10 0HX	www.spanset.co.uk	01606 737494
Total Access	Total Access (UK) Ltd Unit 5 Raleigh Hall Industrial Estate Eccleshall Staffordshire ST21 6JL	www.totalaccess.co.uk	01785 850333
Tag Height Safety	TAG Ltd Waterside Mill Greenfield OL3 7NH	www.tagsafety.com	01457 878640

Personal fall protection and rescue equipment should be CE Marked and comply with appropriate British and European Standards – See **Bibliography**

Annex 2 - GOTCHA System

SPANSET GOTCHA RESCUE KIT

A rescue kit designed for those using fall arrest harnesses and lanyards. The idea of the gotcha is to provide a rescue kit that will enable the rescuer to:

- Attach a casualty who is suspended by a fall arrest lanyard
- Raise a casualty in order to release their current attachment
- Raise or lower the casualty to a point of safety

The above capabilities are all achievable without the need for the rescuer to access the casualty.

Self contained and pre-assembled. In a clearly identified bag as a piece of emergency equipment. Compact and easy to transport or store where needed.

Conforms to EN: 1496

Patent Pending.

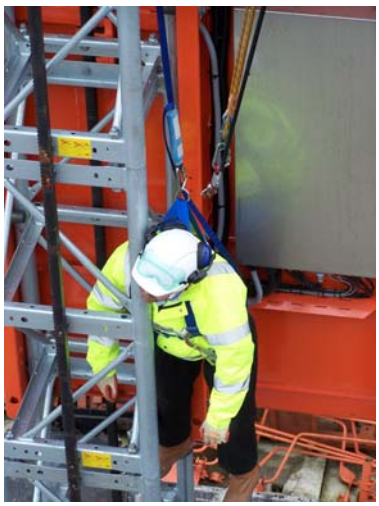
SpanSet (UK) Limited
Telford Way
MIDDLEWICH
Cheshire CW10 0HX
United Kingdom

Telephone:01606 737494
Facsimile: 01606 737502

E-mail: enq@spanset.co.uk

Demonstration of “Gotcha” System Rescue

Gotcha pole lowered to unconscious casualty suspended in harness

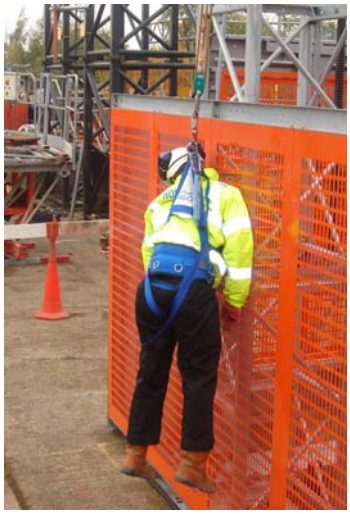


Locking jaws attached to harness “D” ring

Close up of attachment of rescue rope to harness “D” ring

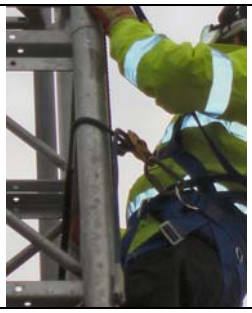
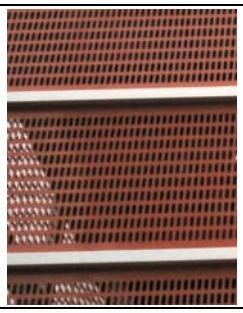
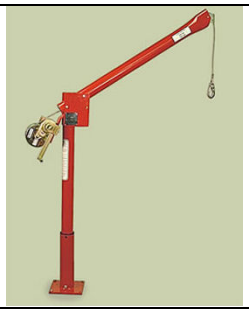
Unconscious casualty being raised clear of the mast cross bracing

Unconscious casualty being lowered to ground



Casualty reaching ground

Annex 3 – Methods of Attaching Lanyards

	✓ Suitable		✗ Not Suitable
Designated Anchor Points		**Handrails**	
	✓ Suitable		✗ Not Suitable
Mast Tubes (avoid sharp edges)		**Mesh**	
	✓ Suitable		✗ Not Suitable
Mast ties (avoid sharp edges)		**Electrical Panels**	
	✓ Suitable		✗ Not Suitable
Purpose Made Attachments		**Erection Crane**	
	✓ Suitable		✗ Not Suitable
Scaffolding		**Sharp Edges**	

Annex 4 – Selection of Personal Fall Protection Equipment

1. Harnesses

Harnesses should be of the full body type with both front and rear lanyard attachment points. There are a large number of basic harnesses on the market which meet the requirements of BS EN 361 but are neither durable nor comfortable for extended wear. Harnesses must always be adjusted correctly to minimise injury to the wearer in the event of a fall.

2. Work Restraint

For work restraint a full body two point harness should be used with fixed or an adjustable lanyard which must always be adjusted so that the wearer cannot reach a position where they can fall. Various designs of adjustable work restraint lanyards are available including one which is colour coded to encourage the wearer to keep it as short as possible.

An energy absorbing lanyard of the correct length may be used for restraint.

3. Work Positioning

Work positioning equipment can be useful to allow the wearer to work in a fixed position with both hands free. To carry this out safely a two point full body harness with integral work positioning belt is required. A fall arrest lanyard must always be connected to a suitable anchor point and the harness whilst the wearer is using the work positioning belt or moving to or from the position at which work is to be carried out. The work positioning belt is used with an adjustable lanyard or grillon connected to or around a suitable support structure.

4. Retractable Type Fall Arrester (Inertia Reels)

Retractable type fall arresters are effective at preventing falls and minimising falling distance. They must however be anchored overhead and must not be used at angles greater than that specified by the manufacturer often 40° to the vertical. Care should be taken to ensure that the retractable webbing/rope does not pass over sharp edges that may cause tears and failure.

Retractable type fall arresters are increasingly being used to provide fall protection by attaching to the hook of a mobile crane positioned vertically above the wearer. In this case the inertia reel should be attached to the crane hook by use of a master link and soft sling to keep the inertia reel well below the hook and clear of lifting slings etc. **The line connecting the inertia reel to the harness should be kept vertical at all times to minimise the pendulum effect in the event of a fall.**

Some retractable type fall arresters incorporate an integral means of rescue, which can be used by a rescuer to raise or lower an incapacitated person to a position of safety.

5. Double Lanyards

Double Lanyards enable the wearer to move around a structure ensuring that one leg of the lanyard is attached to a suitable anchor point at all times (the other leg must not be attached to back to the harness unless it is fitted with a special parking point that will pull away in the event of a fall). It is essential that double lanyards only have ONE shock absorber. If two single lanyards are used and are both attached at the time of a fall the body of the falling person will be subjected to a magnitude of deceleration that is likely to

cause very significant injury. Some personal fall protection equipment suppliers provide “parking points” on the harness webbing to keep the unattached lanyard out of the way.

6. Fall Arrest Lanyards

Fall arrest lanyards are normally 2m long with a karabiner to attach to the harness and either a karabiner or scaffold hook at the other end to connect to the anchor point. All fall arrest lanyards must incorporate an energy absorber to reduce deceleration and hence impact force on the wearer. “Stretchy” lanyards are a useful means of preventing the wearer from becoming entangled in the slack of a lanyard.

7. Horizontal Safety Lines

A number of temporary horizontal safety line systems are available. These consist of a line which can be temporarily installed between two strong points and tensioned using a tensioning device. Certain proprietary systems incorporate an integral tension indicator. Common systems available can have line lengths up to 20m and can be used as an anchor point for work restraint for up to two persons or as a fall arrest anchor for one person. Following installation the line should be labelled with information as to the maximum number of people that may be anchored to it in fall arrest or work restraint modes. Horizontal safety lines should only be installed following an engineering assessment of the location and the structure to which they will be attached.

Additional guidance on selection of personal fall protection systems is given in:-

- *BS 8437:2005 - Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace*

Annex 5 - Example of Typical Risk Assessment and Method Statement

RISK ASSESSMENT – Work at Height during Hoist Installation

ITEM No.	ACTIVITY/ DANGER	HAZARD	SEVERITY (1-low, 3-high)	PROB. (1-low, 5-high)	RISK (1-low, 15-high)	PERSONNEL AFFECTED	CONTROLS	RESIDUAL RISK (Low, Med, High)
1.	Work at height during erection, alteration and dismantling	Fall from height	3	4	12	Erection team members	Use of handrails. Handrails to be fitted to roof of passenger hoists before mast erection.	**Low**
							Barriers on landings. Landings must be made safe by scaffolders as landing gates are removed	**Low**
							Use of full body harness and work restraint lanyard. Full body type harness complete with work restraint lanyard to be worn at all times. Lanyard to be securely fixed to a suitable secure fixing when working outside handrails or exposed to unprotected open edges.	**Low**
							Use of full body harness and fall arrest lanyard. Full body type harness complete with shock absorbing lanyard to be worn at all times. Lanyard to be securely fixed to a suitable secure fixing when working outside handrails or exposed to unprotected open edges.	**Low**
2.	Suspension from fall arrest system following fall	Exposure, suspension trauma and fall from height during rescue	3	4	12	Erection team members	Erection team trained in use of Gotcha rescue system. Rescue system to be carried by all erection teams. Refresher training carried out in accordance with manufacturer’s recommendations	**Low**

ITEM No.	ACTIVITY/ DANGER	HAZARD	SEVERITY (1-low, 3-high)	PROB. (1-low, 5-high)	RISK (1-low, 15-high)	PERSONNEL AFFECTED	CONTROLS	RESIDUAL RISK (Low, Med, High)
3.	Falling materials	Impact with personnel below	3	3	9	Erection team members and site personnel below work area	Using of hazard zone around working area. Site to set up a hazard zone around working area using recognised methods and equipment including warning signs.	**Low**
4.	Working on scaffolding or mobile towers.	Fall from height	3	3	9	Erection team members	Weekly inspections of scaffolds and mobile towers by qualified site personnel. Mobile towers to be erected by qualified site personnel	**Low**
5.	Use of ladders	Fall from height	3	4	12	Erection team members	Use of ladders limited to short duration non-repetitive tasks. Ladders to have pre-use checks, regular inspections and be securely lashed. Only to be used by trained personnel with use of tool box talk for reinforcement.	**Low**

Method Statement for Installation of Alimak Hoist

Contract Location: **Date:**

Hoist Model:

1. Description of Works

To deliver, install, test, carry out thorough examination and commission 1No. Alimak hoist type …….

2. Risk Assessment

The main identified risks are the fall of persons and materials, collapse of unit during installation and electrical incidents.

See separate attached Risk Assessment.

3. Control Measures

a. The installation will be carried out strictly in accordance with manufacturer's recommendations. All personnel will have the Manufacturer's Installation manual available.

b. All erection personnel have been trained and are experienced and competent in the installation of this type of machine and are in possession of achievement test certification. Also all personnel are in possession of a current C.C.N.S.G. Safety Passport.

c. All erection personnel will have received manual handling training. A manual handling assessment for this operation has been completed and is attached.

d. Where ladders are used they will be securely lashed.

e. All lifting equipment and lifting accessories will have current test and thorough examination certificates which will be available for inspection on site. All crane operators and slinger/signallers will have CPCSC cards or equivalent.

f. When working on top of the hoist car full body safety harnesses and lanyards will be worn at all times. The lanyards will be attached when exposed to unprotected open edges or any other situations where there is the risk of a fall. All personnel carry harness inspection record cards, which they are responsible for updating.

g. In the event of a fall of personnel wearing a fall arrest system, the following will apply:

i) If the person is not obviously injured and is conscious, a simple rescue by other engineers working from the hoist roof / platform may be possible, by using the erection winch attached to the harness and also pulling manually on the harness lanyard. Alternatively the Gotcha system will be deployed to effect a rescue either to the hoist car or to ground level.

ii) In the event of the suspended person being recovered to the hoist car, the car will be lowered to the ground/base position.

h. An exclusion zone at ground floor level must be set up, by site, around the working area using approved equipment together with warning signs to prevent unauthorised persons entering the exclusion zone

i. Hoistway and landing protection must be installed by the user to prevent contact with the hoist during installation, as required by PUWER 1998 / LOLER 1998.

j. A competent electrician will be required to connect and make safe electric power supply to hoist. A 110-volt supply for the operation of hand tools is also required. (All 110-volt equipment will have PAT test tags attached).

k. All personnel will be made aware of the contents of this method statement and associated risk assessment and will sign the front copy to acknowledge receipt and understanding.

l. All personnel will have attended site induction courses (where applicable).

Annex 6 – Example Toolbox Talks

Working at Heights

Tool Box Talk - Working at Heights

Date Held:	Location:	Time Held:

Introduction:

Falling from height is the major cause of fatalities in the construction, petrochemical, rail & nuclear industry. Falls from any height may result in death or serious Injury. All such deaths and serious injuries are preventable.

Main points:

- Can work at height be avoided and the risk eliminated?
- Plan work at height to include safe access/egress, edge protection (for people and materials), PPE and suitable training as applicable.
- Work at height requires guardrails, intermediate guardrails and toeboards to be fitted where possible. Alternative collective means of protection include MEWPs, podium steps and tower scaffolds.
- Where impracticable to fit guard-rails, intermediate guard-rails and toe-boards (short duration work such as the installation of the swing round fly jib or inserting securing pins to main boom head section) then personal fall protection equipment must be utilised as required. Operators must use their working at height PPE kit bag when carrying out work at height.

Discussion points:

- If roof work is involved, identify any fragile areas and/or openings and implement suitable protective precautions.
- Access ladders must be secured and extend at least 1 metre beyond working platforms to allow for safe access/egress.
- Where access ladders run for more than 9m then suitable intermediate platforms must be provided.
- Consider weather conditions – wet, windy and/or icy conditions can have a serious impact on safety at height.
- Ensure operatives are suitably trained and physically capable for tasks being undertaken.
- If guard-rails, fragile surface covers, void protections, etc, are removed for any reason they must be replaced as soon as possible, and in the interim should be physically guarded.
- Use crawling boards/roof ladders where applicable.

IT'S NOT THE FALLING THAT HURTS – IT'S THE LANDING!

Mobile Tower Scaffolds

Tool Box Talk - Mobile Tower Scaffolds

Date Held:	Location:	Time Held:

Introduction:

Mobile tower scaffolds provide a very useful and efficient working platform for numerous tasks when used properly. When misused, there is a significant risk of serious injury to both users and other employees.

Main points:

- Plan the use of mobile tower scaffolds. Ensure that they are of sufficient capacity, that manufacturer's guidelines are complied with and that a competent person is available to erect, adjust and dismantle.
- Check all mobile tower scaffolds prior to use. Check: general condition, brakes/locking devices, free rotation of wheels, all bracings are in place, suitable access/egress is available and that the platform is suitable.
- All guard-rails, intermediate guard-rails and toe-boards must be fitted (note this is a minimum requirement – recommended that they be fitted regardless of height).
- Use one of the two safe methods of work for the erection of towers recommended by PASMA:-
    - The advanced guardrail system which makes use of specially designed temporary guard rail systems which are locked in place from the level below and moved up to the platform level.
    - The 'through the trap' (3T) method which allows the person erecting the tower to position themselves at minimum risk during the installation of the guard rail components to the next level.

Discussion points:

- Check manufacturers guide for base to height ratio. The general rule is that the height should not exceed 3 times the narrowest base width, i.e. where narrowest base width equals 1.5m, height should not exceed 4.5m. (Note: this can be extended by use of outriggers.)
- Mobile tower scaffolds should only be used on firm, level surfaces. If the surface is soft or not level adequate support **must** be provided.
- Wheels should be locked whenever the tower is in use.
- Only integral ladders should be used – on no account rest ladders against outside, or use ladders on the decks of mobile tower platforms.
- Ensure that all persons and materials are removed from mobile tower scaffolds prior to moving. Move by pushing at the base, avoid potholes/uneven surfaces, and beware of overhead obstructions – especially power lines!
- Mobile tower platforms should be fully boarded out where practicable. The platform must be a minimum of 600mm wide.

MOBILE TOWER SCAFFOLDS ARE AN ASSET – NOT A SHORTCUT.
NO JOB IS SO URGENT THAT IT CAN'T BE DONE SAFELY!

Use of Ladders

Tool Box Talk - Use of Ladders

Date Held:	Location:	Time Held:

Introduction:

Ladders are one of the most used, and abused, pieces of equipment on a Construction site. When abused and misused, they have enormous potential to cause accidents and injuries.

Main points:

- Ladders are essentially a means of access/egress and should only be used as working platforms for very short duration tasks, where alternative platforms would be impracticable and where such tasks can be carried out safely using a ladder.
- Only industrial class ladders should be used. These must be in good condition (no missing/broken rungs, split stiles, etc).
- Ladders must be suitable angled (1 unit out for every 4 units up) and suitably secured (Preferably tied off at the top using both stiles to prevent both sideways slip and rotation).

Discussion points:

- Ladders must extend at least 1 metre beyond working platforms to allow for safe access/egress.
- Beware of overhead obstructions, especially overhead power lines (metal ladders/metal reinforcements).
- Ladders must not be painted (this hides defects), should be stored correctly and be subject to regular inspection.
- Never take serviceability for granted, always carry out a visual check prior to use. Report any defects immediately.
- Never carry out home made repairs on a ladder, and never use a ladder with existing home made repairs, and never use a home made ladder!
- Always stand ladders on a firm base. Never use milk crates, oil drums, etc., to gain extra height, and if ground is soft use suitable support. Consider staking at bottom.
- Never use rungs as a support for planks, or rest rungs on planks.
- Remove excessive mud, grease, etc. from footwear prior to climbing/descending a ladder.
- Always use both hands to climb/descend, and always face the ladder.
- Do not carry loads up ladders – use hoists or alternatives.
- Never over reach from ladders – get down and move them.
- Avoid using metal ladders against metal surfaces – the reduced friction makes them more liable to slipping.

SILLY PEOPLE TAKE CHANCES – SENSIBLE PEOPLE TAKE PRECAUTIONS

Attendance Record

Toolbox Talk Attendance Record			
Toolbox Talk Subject:			
Toolbox Talk Deliverer	**Name:**		
	Signature:		
Attendees			
Name	**Trade**	**Company**	**Signature**

Annex 8 – Bibliography

Legislation

Health and Safety at Work etc. Act 1974.

Work at Height Regulations 2005.

Provision and Use of Work Equipment Regulations (PUWER) 1998.

The Lifting Operations and Lifting Equipment Regulations (LOLER) 1998.

The Construction (Design and Management) (CDM) Regulations 2007.

The Management of Health and Safety at Work Regulations 1999.

Standards

BS 7121-1:2006, *Code of practice for safe use of cranes — Part 1: General*

BS 7883:2005 - *Code of practice for application and use of anchor devices conforming to* BS EN 795*.*

BS 8437:2005 - *Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace.*

BS 8454:2006 - *Code of practice for delivery of training and education for work at height and rescue.*

BS8460:2005 – *Safe use of MEWPs – Code of practice*

BS EN 353-1:2002 - *Personal protective equipment against falls from a height: guided type fall arresters including a rigid anchor line.*

BS EN 353-2:2002 - *Personal protective equipment against falls from a height: guided type fall arresters including a flexible anchor line.*

BS EN 354:2002 - *Personal protective equipment against falls from a height — Lanyards.*

BS EN 355:2002 - *Personal protective equipment against falls from a height — Energy absorbers.*

BS EN 358:2000*, Personal protective equipment for work positioning and prevention of falls from a height — Belts for work positioning and restraint and work positioning lanyards.*

BS EN 360:2002 - *Personal protective equipment against falls from a height — Retractable type fall arresters.*

BS EN 361:2002 - *Personal protective equipment against falls from a height — Full body harnesses.*

BS EN 362:2004 - *Personal protective equipment against falls from a height — Connectors.*

BS EN 363:2008 - *Personal protective equipment against falls from a height — Fall arrest systems.*

BS EN 795:1997*, Protection against falls from a height — Anchor devices — Requirements and testing.*

BS EN 1496:2006 - *Rescue equipment — Rescue lifting devices.*

BS EN 1497:2007 - *Personal fall protection equipment — Rescue harnesses.*

HSE Publications

CIS 58 - *The selection and management of mobile elevating work platforms.*

INDG 73 - *Working alone in safety.*

INDG 367 – *Inspecting fall arrest equipment made from webbing or rope.*

INDG402 - *Safe use of ladders and stepladders: An employers' guide.*

INDG403 - *A toolbox talk on leaning ladder and stepladder safety.*

INDG405 - *Top tips for ladder safety (Pocket Card.)*

OC 282/31 – *Rope evacuation from mechanical handling equipment.*

HSE Research Report 437 - *The underlying causes of falls from vehicles associated with slip and trip hazards on steps and floors.*

CPA Publications

Best Practice Guide - *Working at Height Loading and Unloading Transport.*

Best Practice Guide - *Work at Height on Mobile Cranes.*

Useful Websites

Construction Plant-hire Association	www.cpa.uk.net
Construction Skills	www.constructionskills.net
Health and Safety Executive	www.hse.gov.uk
Safety Assessment Federation	www.safed.co.uk
Strategic Forum for Construction	www.strategicforum.org.uk
UK Contractors Group	www.ukcg.org.uk