Safe Use of Ladders in the Specialist Access Industry

ATLAS

The Association of Technical
Lightning and Access Specialists

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Safe Use of Ladders in the Specialist Access Industry

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Requests to use any part of this guide should be made in writing to:

Association of Technical Lightning & Access Specialists (ATLAS)
AIMS Administration Centre
7 Newton Place
Glasgow
G3 7PR

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ATLAS Safety Committee
Colin Watt Associates
HSE Health & Safety Executive

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Mr James Burns, Chairman of the Access and Safety Committee

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Foreword

Every year there are deaths and serious injuries in the construction industry, with work at height accounting on average for just over half of all fatalities.

By the very nature of its business, the specialist access industry is predominantly concerned with this type of work. The Health and Safety Executive (HSE) encourages and welcomes industry guidance such as this produced by ATLAS.

The Work at Height Regulations 2005 set out a series of simple steps for fall protection which must be followed. It is important to make sure that all work at height is properly planned, supervised and carried out by competent people. This includes using the right type of equipment for the job.

HSE acknowledges the work of ATLAS and those involved in producing this guidance. It provides practical solutions and examples of safe methods of work for laddering from within the specialist access industry. The guidance should be of interest to those involved in the planning, designing, arranging or controlling specialist access work and I commend its use to all concerned.

HSE recognises that this guide contains some advice that may go further than the minimum needed to comply with health and safety law.

Philip White
HM Chief Inspector of Construction, Health and Safety Executive

Preface

Year after year, construction workers in the height industry are killed or injured whilst at work due to misuse of plant and equipment, inadequate training and failure to plan work properly. Whilst these figures have improved over the years, the aim should be to have zero accidents.

These improvements have been achieved by employers taking the initiative in endeavouring to create a safe place of work for their employees and others affected by their acts. This is often more readily achievable when like minded companies come together within one organisation such as ATLAS to set standards and best practise for their industry.

ATLAS are all too aware of the effect that deaths, injuries and ill health cause to families, friends and work colleagues. They are also aware of the cost in industrial injuries claims, medical treatment, and lost time at work.

This guide has therefore been created in order to ensure that accidents and incidents are kept to a minimum.
The aim of this guide is to help those involved in construction but is specifically aimed at work at height and specialist access activities - and to explain how to eliminate related hazards and control the risks. The guidance is simple and may have general relevance to others in the construction process, but particularly for those directly involved in providing specialist ladder access.

ATLAS is the leading organisation in the UK in relation to the use of specialist access type ladders and is currently involved in producing further guides for the industry.

To ensure a continuous high standard in relation to specialist access work, ATLAS members are strictly regulated. You may therefore be reassured that member companies will be consistent in the high level of service and standards they provide in all matters relating to health & safety.

“ATLAS gratefully acknowledges the help and guidance provided by the Health and Safety Executive in the preparation of this guide and thanks Philip White, HM Chief Inspector of Construction, for providing a Foreword."

John Jolly
ATLAS President

Introduction

Why is this guidance needed?

1. Falls from height remain the most common type of accident causing fatal injuries and account for over half of the fatalities in construction. Access specialists when installing, moving or removing ladders have to constantly deal with the risk of falling. Working at height is recognised as a high risk activity because of the potential for grave consequences should a fall occur, such as serious injury or death. Additionally, specialist access activities often take place where other hazards exist. Therefore this guidance has been produced to aid employers meet their responsibilities by ensuring that adequate measures are taken to eliminate or minimise risks to their employees and others who may be affected by their work.

2. ATLAS have produced this edition of safety guidance, ASG 001, as 'Specialist access industry good practice'. The aim of this document is to illustrate current preventative and protective measures that should be utilised when establishing safe systems of work to prevent and protect against falls from height particularly whilst using specialist access ladders.

3. Employers have legal duties to carry out suitable and sufficient assessments of risks to health and safety and to use the findings to provide, so far as is reasonably practicable, safe systems of work for their employees. This guide is designed to be used as reference by employers, clients, designers, contractors and enforcing authorities when preparing and reviewing risk assessments for the erection, alteration, dismantling of temporary access and laddering by access specialists.

4. Employers have a general duty under Section 2 of the Health and Safety at Work Act 1974 to ensure, so far as is reasonably practicable, the health, safety and welfare of their employees at work. In part, employers can achieve this by the provision of safe systems of work and carrying out risk assessments. This guide will assist in the provision of these.
   However this guide should be used not only by employers but clients, CDM Co-ordinators, designers, contractors, organisations and others who may be affected by the acts described herein.
   Most importantly this guide shall be made available to employees who will be engaged in the activity which this relates to.

5. The types of structure, nature of work and environmental conditions vary considerably within the work at height industry. However within this guidance ATLAS has endeavoured to:

   - Explain the Work at Height Regulations.
   - Identify and explain the significant hazards that access specialists are exposed to during typical specialist access operations involving the use of ladders.
   - Highlight the practical solutions available to control the risks that arise from those hazards.

   This guidance is not exhaustive and does not feature every specialist access laddering application, however, it has been designed so that the basic principles contained within this document can be applied as solutions to most of these operations.

What is this guide about?

6. This document contains guidance on how to plan and work safely at height in the specialist access Industry following the requirements of the Work at Height Regulations 2005 (as amended). Whilst the guidance is specifically related to the use of specialist access ladders, the principles set out could be applicable to any work at height.

7. The main problems that need to be addressed are falls from ladders whilst they are being installed, used or removed. In most cases straightforward physical protection measures can prevent accidents occurring but too often a lack of foresight, planning and poor management control means fall protection is neglected during high risk work, leading to accidents.

8. Not all the safeguards in this guidance will be relevant in all circumstances. Those who are planning the work should consider the extent and the nature of the risk in a specific job and then plan a safe method of work from there. This guidance is structured to identify precautions that are particularly relevant when installing and removing ladders. However, risks are significant in all specialist access work and high standards of safety are necessary to provide adequate protection at all times.

Who should read this guide?

9. Specialist access work is not just an issue for specialist access companies. Other stakeholders such as site owners and principal contractors need to be aware about how work is carried out on sites which they have control over. This guidance therefore will be useful to anyone planning, arranging, designing or having control over work involving specialist access, including:

    - Directors, Partners and Proprietors of companies who carry out specialist access work;
    - Clients of projects involving specialist access work;
    - Designers and specifiers of structures and components;
    - CDM Construction (Design and Management) Regulations 2007 Co-ordinators;
    - Principal and Sub-contractors for projects that including specialist access work;
    - Owners of sites and structures where specialist access work may take place;
    - Trade union safety representatives and employee's safety representatives;
    - Anyone carrying out specialist access work, including employees and self-employed; and
    - Safety consultants and advisors.

Other Useful Information Sources

10. This guide has been based on information available from ATLAS and other publications relating to construction work in general. Appendix 5 at the back of this guide gives a list of useful publications and indicates where you can find advice. Support documentation is freely available via the ATLAS website.
    Example calculations are available on the ATLAS website.

The Law

11. There is a range of law relevant to specialist access work safety. The principal elements are:
    - The Health and Safety at Work Act 1974;
    - The Work at Height Regulations 2005 (as amended);
    - The Management of Health and Safety at Work Regulations 1999;
    - The Construction (Design and Management) Regulations 2007;
    - The Lifting Operations and Lifting Equipment Regulations 1998;
    - The Personal Protective Equipment at Work Regulations 1992 and
    - The Provision and Use of Work Equipment Regulations 1998.

Planning for Safety

12. Planning is vital to ensure safety where work at height is involved irrespective of the scale or task. Planning by all parties involved is essential to ensure the work is carried out safely, efficiently and without undue delay.

13. The Construction (Design and Management) Regulations 2007 (CDM) identify the role of each party of a construction contract and set out specific guidelines for them to follow. For more information, see the Construction (Design and Management) Regulations 2007.

14. In addition to those actually carrying out work at height it is essential that the hazards associated with working at height are recognised and understood by the client or customer who commissions or arranges for the work to be carried out and the designer, where there is one. (Note that a designer may be a contractor who produces a specification or scheme of work and may not be a professional design or architectural practice.)

15. The client or customer must make sure that the individual or company they have employed to carry out height work is competent to do so and is aware of the hazards and precautions to be taken for the work to be carried out safely. They must also make sure that any installation or removal of equipment, repair, alteration or materials selected will not create additional hazards for future maintenance, access or demolition of the structure.

16. Falls from height are the largest cause of death in the construction industry, accounting for 50% of all fatal accidents. Therefore, work at height should be recognised as a high risk activity because of the potential for grave consequences should a fall occur, such as serious injury or death. As part of the planning process, appropriate precautions should be taken dependant on the nature of the work. The basic principle, as embodied in the Work at Height Regulations 2005, is that all reasonably practicable measures should be taken to prevent anyone from falling. The Regulations set out a simple hierarchy which can be summarised as follows:
    - Avoid work at height where possible
    - Prevent falls by the use of work equipment or other measures, where you cannot avoid working at height
    - Minimise the distance and consequences of a fall should one occur by the use of work at height equipment or other measures, where you cannot eliminate the risk of a fall
    - Give priority to collective protection over personal protection at all stages

    In the Regulations, there is no distinction between high and low falls so for any work at height, no matter how high or low, precautions are required to prevent falls, or to minimise the risk of injury in the event of a fall. Work at height need not just be above ground level but also includes work below ground where a person could be injured if they fell, e.g. entry into and down a shaft."

Risk Assessments

17. A site specific risk assessment should be carried out, to identify health and safety hazards and the risks they pose, before any work at height takes place.
    A risk assessment is compulsory in health and safety law. The law does not expect employers to eliminate all risk but they are required to protect their employees and others affected by the work so far as is reasonably practicable.

18. The risk assessment is a careful examination of what, in the operation of working at height, could cause harm to people, so that you can weigh up whether you have taken enough precautions or should do more to prevent harm. Workers and others have a right to be protected from harm caused by a failure to take reasonable control measures.

19. The following principles of risk assessment should be followed when determining

methods and sequences of work:

Step 1 – Identify the hazards associated with the proposed work;
Step 2 – Decide who might be harmed and how, including workers, site visitors, members of the public and anyone affected by the work;
Step 3 – Evaluate the risks and decide on the precautions and/or control measures required by, for example, comparison with good practice or categorization of the risk level (likelihood and severity);
Step 4 – Record the findings and implement the control measures for the residual risks;
Step 5 – Review the risk assessment based on practical experience as work progresses and update/amend as necessary.

20. A risk assessment should be a systematic examination of what in the workplace could cause harm to people, so that decisions can be made as to whether existing precautions or control measures are adequate or whether more needs to be done to prevent harm. If consideration has been given to reducing harm, for example through equipment or system of work and the risk is still unacceptable, alternative control measures should be applied until the risk is acceptably low.

Method Statements

21. A competent person should prepare a site specific safety method statement before any work at height starts. It should be appropriate to the scale and complexity of the work. In all cases, it should ensure that health and safety risks identified by the risk assessment are addressed by detailing appropriate control measures which remove or reduce the risk to an acceptable level. It should identify working positions, access routes to the point where the ladders will be installed and show:

- how falls are to be prevented, or where this is not possible, to minimise the distance and consequences;
- how the risk from falling materials to those at work below and others affected by the work, for example members of the public, is to be controlled;
- how risks to health will be controlled;
- how other risks identified at planning and survey stages are to be controlled, e.g. working in the proximity of hot gasses
- what equipment will be needed;
- what competence and/or training is needed;
- who will supervise the job 'on site':
- how changes in the work will be dealt with without affecting safe working;
- who will check that the system is effectively controlling risk and
- how emergency situations will be dealt with, for example the rescue of an incapacitated person at height or evacuation in case of fire.

22. Method statements should be clear and illustrated by simple sketches where necessary. There should be no ambiguities or generalisations, which could lead to confusion. They should be produced for the benefit of those carrying out the work and their immediate supervisors and not be over complicated.

23. Equipment needed for safe working should be clearly identified and available before work starts. Workers must know what to do if the work method needs to be changed. The above points should help avoid 'ad hoc' methods of work on site and the use of improvised equipment, which can often lead to accidents.

24. Where provision has been made on the structure to assist the installation of temporary access systems, e.g. permanent anchor points, then details of these should be held on the Health and Safety File (required under the CDM Regulations). Inspection records, details of repairs or alterations carried out during the life of the structure should also be added to the Health and Safety File to provide information to future clients, occupiers, designers and contractors.

Weather Conditions

25. You should anticipate adverse weather conditions and take suitable precautions. The Work at Height Regulations 2005 specifically require that weather conditions be considered when planning any work at height and that work is postponed while weather conditions endanger health and safety. Rain, ice or snow can turn a secure footing into a hazard. Access ladders, scaffolding and roofs etc should be inspected on every occasion before work starts to see if conditions have changed and to check whether it is safe to work. It is important that weather conditions are continually assessed as part of the risk assessment process as work proceeds.

26. A sudden gust of wind can lead to loss of balance. Ladders, scaffold boards and associated equipment etc., should be handled with care or not used at all in windy weather conditions as people can easily be thrown off-balance while carrying or handling them.

27. Where necessary, work areas should be netted to prevent the loss of equipment or material from scaffolds and work areas.

28. When deciding whether to continue or suspend work, consider:
    - Wind speed at specific locations
    - The measures that have already been taken to prevent falls of persons, equipment and materials from height; and
    - The possibility that the wind may have a different affect depending on different heights and locations.

    As well as collating information from weather advice sources, a competent contractor should consider the use of a hand held anemometer to measure wind speed at specific locations and where the risk may be high.
    The Beaufort scale gives descriptions of how trees, smoke etc will behave at certain wind speeds.

Description of Wind	Effects on land	mph	m/s
0 Calm	Smoke rises vertically.	0-1	0
1 Light Air	Direction of wind shown by smoke drift, but not by wind vanes.	1-3	1
2 Light Breeze	Wind felt on face, leaves rustle, ordinary vanes moved by wind.	4-7	2
3 Gentle breeze	Gentle breeze, small twigs in constant motion.	8-12	4
4 Moderate wind	Dust, leaves and loose paper raised. Small branches move.	13-18	6
5 Fresh wind	Fresh breeze. Small trees in leaf begin to sway.	19-24	8
6 Strong wind	Strong breeze, large branches move. Whistling heard in phone wires. Umbrellas become difficult to use.	25-31	10
7 Very strong wind	Whole tree in motion.	32-38	14-16
8 Gale	Twigs break off trees. Difficult to walk.	39-46	18-20
9 Severe gale	Slight structural damage occurs – chimney pots and slates removed.	47-54	22-24
10 Storm	Trees uprooted. Structural damage.	55-63	26

29. The risk from lightning strikes when working at height should also be considered and should be addressed in a risk assessment. You should monitor weather forecasts and seek advice from organisations such as the Met Office to be kept up to date with any warnings.

30. Access specialists are regularly exposed to sunlight. They are therefore at particular risk from the effects of ultraviolet radiation on the skin. Simple precautions can significantly reduce the risk of skin cancer. For example suitable clothing and use of sunscreens. This hazard should be addressed in a risk assessment.

Competency

31. Work at Height can be a high-risk activity, so it is essential that anyone wishing to have specialist access work carried out makes sure that the contractors they choose to carry out the work are competent to do so.

32. A contractor should be able to demonstrate:
    - sufficient knowledge of the particular type of work they are being asked to carry out and the risks it will entail;
    - current and sufficient experience of the latest techniques, equipment, standards and materials to enable them to carry the work out safely; and
    - relevant training (including safety) or accreditation by a recognised training body.

33. It is important that contractors have up-to-date knowledge, experience and training. Although experience is a major factor, if it is based on poor or inadequate initial training or out-of-date knowledge it can be worthless. People should understand the reasons why safe working practices are necessary.

34. The contractor should have adequate resources to be able to carry out the job safely, such as providing suitable on-site supervision, operatives and equipment.

35. Checking whether a contractor is a member of ATLAS is also useful as this provides assurance that the contractor is regulated and is subject to a complaints procedure.

36. For further information regarding the competence of companies under CDM Regulations, a 'Core criteria for demonstration of competence' assessment has been produced in Appendix 4 of *Managing health and safety in construction. Construction (Design and Management) Regulations 2007, Approved Code of Practice*

37. For further information on competence and training for access specialist workers see Appendix 2

Training and Instruction

38. All operatives should have received appropriate and recorded training in the requirement of this work at height guidance, together with any specific instructions to be followed for a particular task (e.g. method statement/risk assessment). Training should be properly organised and include both theory and practical elements.

39. Line management responsible for the planning, design, supervision and monitoring of specialist access operations also need training to raise their level of awareness and understanding of the requirements necessary for work at height.

Supervision

40. Employers should ensure an appropriate level of competent supervision is provided, considering the nature of the work and competence of the access specialists involved.

41. Employers who gain high degrees of employee co-operation and compliance also demonstrate a positive attitude, management commitment to health and safety and effective supervisory control.

Monitoring and Reviewing

42. With any business activity, checks need to be made to make sure that what should be happening is actually being carried out in practice and that people are fulfilling their duties. Checking health and safety precautions are being taken is as important as checking progress and quality. Site supervisors need to see that their company considers the fulfilment of their corporate health and safety responsibilities as an essential part of the construction work. Contractors need to be clear about the following:

- Who is responsible for monitoring health and safety on site and are they trained and competent to carry out this role? How often should this monitoring be carried out and what system do you have in place to check what it is?

- Who is responsible for managing and monitoring any contractors while they are on site to check they are working safely and to their method statement as agreed? Are contractors expected to sign in and report to a named site contact so that their presence on site is always known? What is your method of dealing with contractors or individual employees who fail to work safely?

- If a safety adviser is employed to visit sites and review safety, do they report problems to the site manager and to the employer? Are matters put right and how will you receive confirmation of this? Do the same problems keep recurring**?** If there are problems, do you find out why, and take appropriate action.

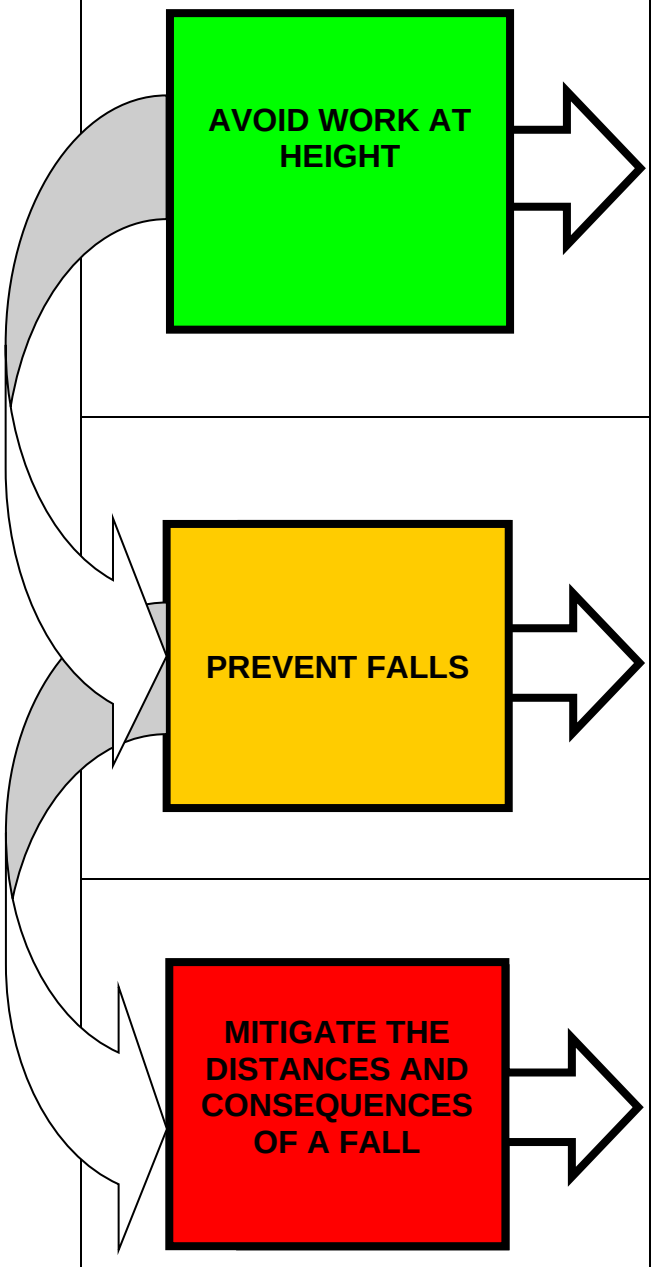
- Act before there is an accident or someone's health is damaged. Keeping a record of accidents, including near misses, illnesses and treatments will help to identify trends. If an accident happens, find out what happened and why. Minor accidents and 'near misses' can give an early warning or more serious problems. Consider whether the accident would have happened if the work had been better planned or managed or employees had been better trained. Could site or company rules have been clearer or could plant and equipment have been better maintained, designed or installed. Don't just put the blame on human error or other people without thinking **why** the error was made.

  It is essential to understand that unless you monitor and review what is being done you increase the likelihood of an accident occurring or reoccurring.

Hierarchy for Work at Height

43. The Work at Height Regulations 2005 (as amended 2007) set out a hierarchy of fall protection measures to be taken when planning work at height. The hierarchy has to be followed systematically and only when one level is not reasonably practicable may the next level down be considered.

Work at Height Regulations – Hierarchy of Controls



Avoid work at height so far as is reasonably practicable:

Due to the nature of their work, specialist access contractors are usually involved when avoiding work at height is not an option. However there may be opportunities to reduce the time spent working at height.

Designers and Principal Contractors should identify opportunities to avoid or reduce time spent working at height.

Specialist Access Contractors should promote innovations to their clients that can avoid or reduce time spent working at height.

:

Where it is not reasonably practicable to avoid work at height you should **consider:**

Preventing all falls from height where there is a risk of injury regardless of the height.

Use collective protection measures as a priority over personal protection.

Collective protection such as guard-rails on permanent structures, scaffold platforms and mobile elevating work platforms provide passive fall protection which does not require any input from the users to be effective.

Where it is not reasonably practicable to avoid or prevent falls; then,

The distance a person can fall and the consequences (potential injury) should be minimised.
Collective protection in the form of soft landing systems (e.g. Air-bags and safety nets) are not commonly a practical solution for Access Specialists.
Personal fall protection systems (safety harnesses) **MUST** be worn and attached to a suitable anchor point – in accordance with this guide – when at risk of a fall. This may also include rope access.

GIVE COLLECTIVE PROTECTION PRIORITY OVER PERSONAL PROTECTION

Hierarchy in Steps

Step 1 – Avoid work at height

44. Specialist access work by its nature requires operatives to work at height. However, the length of time and the number of operatives required to work at height can be greatly reduced by planning and carrying out some of the tasks at ground level. For example, where the gunite lining of a flue within a chimney requires replacing, consideration should be given to the removal of the flue and the lining applied whilst the flue is at ground level. Another example is designers should also consider incorporating permanent ladders on new or existing stacks, chimneys and towers, thus reducing the time spent working at height.
It should be noted that changes to existing structures should only be carried out following consultation and approval by a qualified person to ensure there will be no adverse effects regarding the structure's integrity.

Step 2a – Fall prevention: collective measures

45. When working at height there are several ways to provide collective fall prevention using different types of equipment or using alternative systems of work. These can include but are not restricted to:
    - Existing work platform used as a place of work or as a means of access to or egress from a place of work such as gangway, gantry and stairway.
    - Scaffolding (including tube and fittings, system type and specialist design such as bolt-on modular 'A' frames)
    - Mobile towers
    - Powered access (including MEWPS (mobile elevated work platforms), mast climbing work platforms and suspended cradles)
    - Edge protection (including scaffold systems and edge protection systems)

46. Due to the limited options of equipment and site constraints for access to high structures, the use of specialist access type ladders may be the reasonably practical option**.** However, the use of ladders should not be considered the default position and the practicability of other means of access, further up the WAH hierarchy, should be considered first. For example, on smaller structures, the use of MEWPs may be a safe and practical alternative. If the task is inspecting the structure, it is often safer to do so from the guard railed platform of a MEWP as opposed to depending on the stability and integrity of a structure which is still in the process of being inspected. In some cases where cladding is present, weaknesses and defects are often hidden from the person climbing and inspecting the structure. (See ATLAS Guide to the Inspection of Single Flue Industrial Steel Chimneys).

Step 2b – Fall prevention: personal measures

47. Applies to any 'active' measure used by an individual worker that prevents a fall. Work restraint systems use a body holding device connected to a reliable anchor to prevent a user from reaching zones where the risk of a fall exists.
Using work restraint, an operative is prevented from reaching an open edge due to the length of lanyard or safety line being shorter than the distance to the edge. Fundamentally a work restraint system prevents the initiation of a fall.
(The use of personal fall-protection systems is detailed in Appendix 1)

Step 3a – Fall mitigation: collective measures

48. Where the risk of a fall cannot be eliminated then work equipment or other measures should be used to minimise the distance and consequences of a fall should one occur.

49. Collective fall mitigation normally consists of safety nets, perimeter catch fans and soft landing systems. These systems are now common place throughout the construction industry however their application may be limited when carrying out specialist access work. This is because of the practicality of installing nets directly below where work will be taking place, and where nets could be installed, they are likely to be too far below the work. However, these systems may be practical where lower level work is being carried out as part of the main specialist access operation.

Step 3b – Fall mitigation: personal measures

(The use of personal fall-protection systems is detailed in Appendix 1)

50. In terms of personal fall mitigation, the type of equipment used is normally a safety harness, some form of energy absorber, an effective anchor point, a lanyard and/or safety lines. This includes work positioning, rope access and fall arrest systems; rope access systems can also be used for work positioning and fall arrest. Specialist access operations vary from the usual construction activities in that the work is often carried out using rope access which with the use of a back-up safety rope becomes an efficient personal fall protection system.

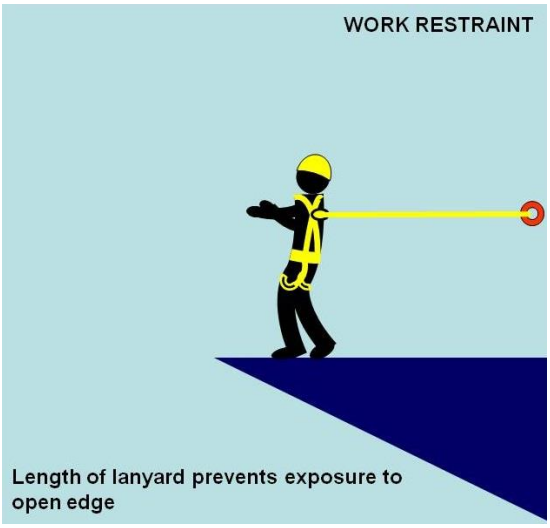


Diagram 1:1 Work Restraint (Illustrative purposes only)

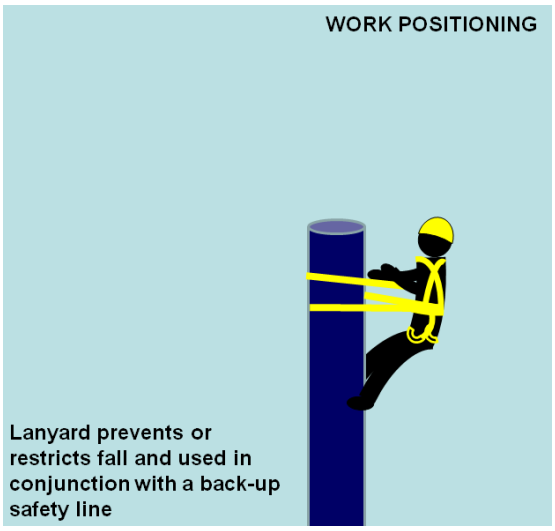


Diagram 1:2 Work positioning (Illustrative purposes only)

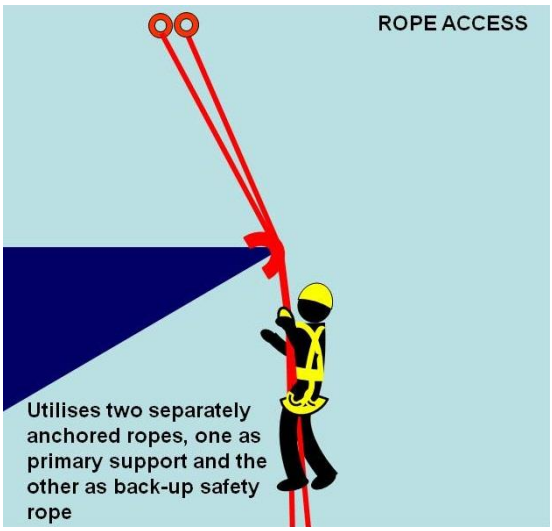


Diagram 1:3 Rope Access (Illustrative purposes only)

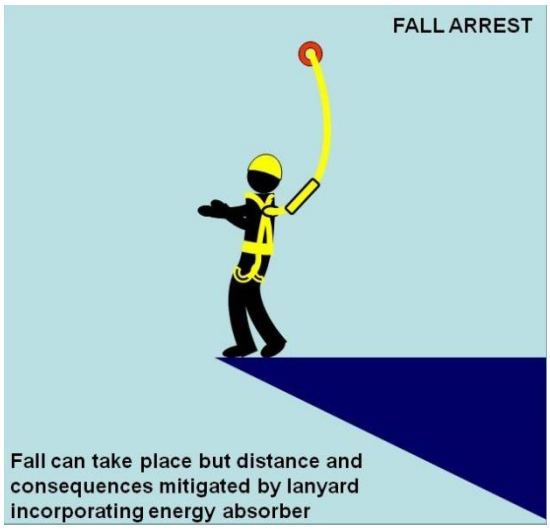


Diagram 1:4 Fall Arrest (Illustrative purposes only)

Laddering Structures

51. Owners of tall structures such as chimneys should consider the hierarchy set out for access to work at height on them. Where other means of access are not reasonably practical (for example by the use of MEWPs) then specialist access ladders can be used. Where the use of ladders is intended, owners/designers should consider the installation of permanent ladders. Consideration should also be given to how fall protection could be achieved for the user of the ladder installation. The permanent ladder installation should be able sustain the forces imposed by the method of fall arrest should the person fall from the ladder. Their installation should be designed by a suitable qualified person so as not to compromise the integrity and stability of the structure.
    The solution should be risk assessed and be specific to the structure.

Using Specialist Access Ladders Safely

Types of Ladders

52. Ladders previously used for specialist access were traditionally referred to as Yorkshire or Lancashire type ladders. Whilst these particular types may still be in use in their original form it is likely that the ladder design combines features from both. This guide does not offer to distinguish between ladder types when laddering but looks at the principles of specialist access ladder installation in general and how they should safely be used. What will be common to all specialist access ladders is the location of sockets or hoops positioned at the top or bottom of each single ladder. The ladders are usually connected vertically by placing the feet of the uppermost ladder into the sockets located on the top of the lower ladder or by placing the hoops at the bottom of the uppermost ladder over the top of the stiles of the lower ladder. At the same time the ladders are held away from the structure by the use of arms or skids (stand-offs) which are located at fixed intervals on each ladder. (See Diagrams 2 & 3).

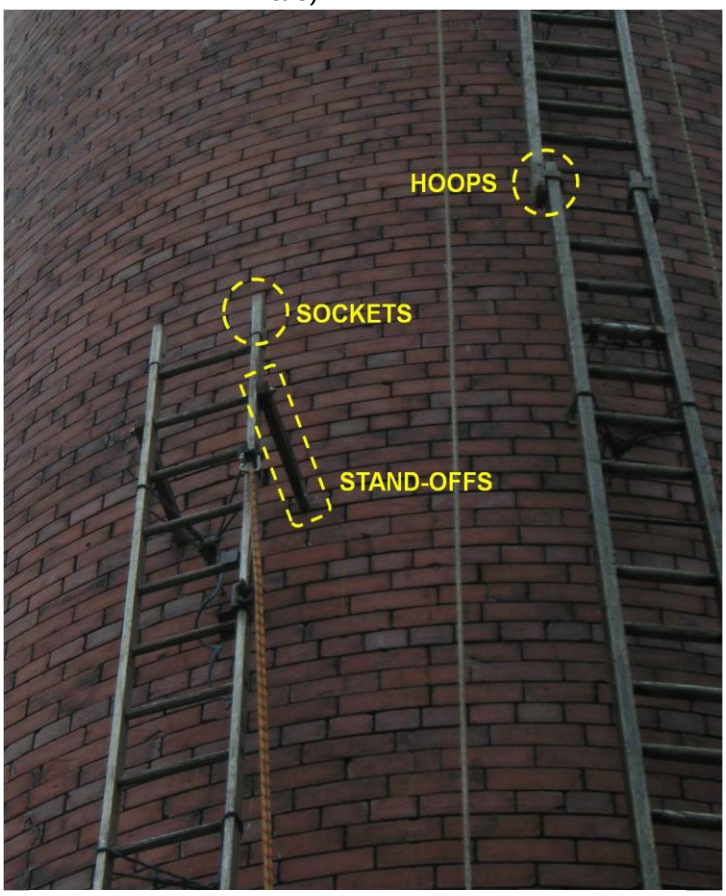


Diagram 2: Example of aluminium and wooden ladders featuring sockets and hoops respectively.
(Illustrative purposes only)

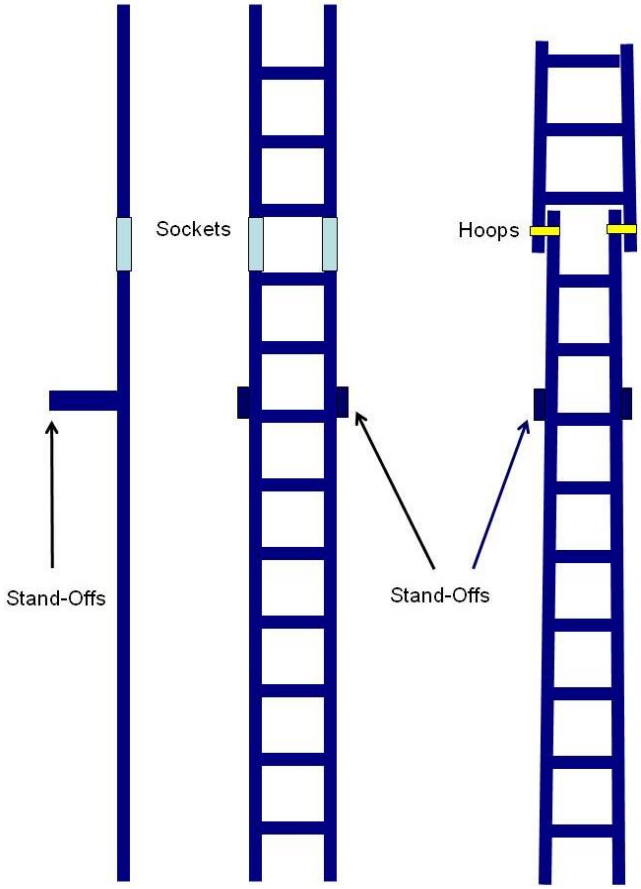


Diagram 3: Typical ladders currently in use
(Illustrative purposes only)

Diagram 4: Aluminium ladder connected to anchor with rope lashing and incorporating wooden stand-off
(Illustrative purposes only)

Diagram 5: Wooden ladder connected to anchor with rope lashing and incorporating steel stand-off bracket which is fixed securely to ladder
(Illustrative purposes only)

53. The ladder type being used currently is normally of a length between 3 and 5 metres with the sections being connected together vertically by sockets or hoops. The use of steel ladder arms to connect ladders to structures has virtually disappeared with ladders now having either timber or aluminium arms, (steel brackets are occasionally used) which are commonly known as stand-offs, fitted purely as a means of holding the ladder away from the structure for foot room. The mechanism for securing the ladder to the structure is to connect the ladder to an eye or anchor installed to or in the structure using rope lashings at a maximum of 1.55 m intervals vertically. Two anchors should be located in line vertically at the bottom of the ladder and one at the top.
All vertical loading is taken by the stiles of the ladders down to the bottom ladder so it is essential that the bottom ladder is securely founded. The lashings and anchors are only there to take any horizontal loading and to stop the ladders moving away from the vertical. (See Diagrams 4 & 5).

Inspection of Ladders

54. There are three types of inspection necessary to be carried out on specialist access ladders. The first type is a pre-use inspection, followed by a daily inspection and finally a formal inspection.

Pre Use Inspection

55. This inspection should be carried out each time a ladder and components is used. This inspection should consist of the following:-

56. **Wooden Ladders:** These should be checked for warping, splitting or rotting of the timber. The ladder should also be checked to ensure that it has been treated to prevent drying out causing the timber to be more susceptible to split or crack. Where metal is incorporated on the ladder i.e. rungs, sockets or hoops, this should be checked to ensure that it does not suffer from rust, and is not bent, corroded or loose.
Also check that the rungs are tight and the same size.

Diagram 6: Ladder not only defective but dangerous

57. Wooden ladders should not be painted (excluding identification markings) as this can hide defects or cracks etc.

58. Sockets or hoops used to connect ladders should also be checked to ensure they are in good condition and are fixed securely to the ladder. Where stand-off arms or skids are attached they should be checked to ensure they are in good condition and securely fixed to the ladder.

59. Where stand-offs are connected to the ladder by bolts or threaded bar they must not be corroded or bent and they must be of sufficient length to ensure a full nut can be run onto them.

60. **Aluminium Ladders:** These should be checked to ensure the stiles and rungs are not bent or cracked. The rungs should be examined to ensure they are of common size, the correct type and are held securely in place.

Diagram 7: Ladder must be inspected prior to use

Daily Inspection

61. Ladders and fixings should be inspected by a competent person (as defined in appendix 2) daily during use whilst ascending, descending and using the ladders. Attention should be paid in particular to all temporary equipment such as lashings and arms/stand-offs to ensure they remain secure and in good condition. A detailed inspection shall also be carried out following prolonged absence from site, after bad weather and/or any other potential for disturbance caused by any physical or mechanical induced action including the work activity, site processes and any exceptional event such as damage/failure of components of the ladder/anchor system equipment.

Formal Inspection

62. The third type of inspection is a formal recorded inspection which should be carried out at regular intervals with a schedule determined by the owner of the ladder taking into consideration the conditions under which the ladder has been used and should be in accordance with manufacturer's instructions. It is unlikely these intervals would exceed 12 months. These inspections shall be carried out by a competent person who is capable not only of being able to thoroughly examine the ladder but should be able to record the findings in a register or similar. To this end the ladder needs a unique form of identification so that the relevant information and findings of the inspection can be recorded as detailed below.

63. It is recommended therefore that the ladder has an identification mark attached and that mark or number should be entered in a record book or register and the findings of the examination recorded against the identification mark. The register shall include when the ladder was manufactured, when it came into first use, the length of the ladder, type of ladder, material of construction and components and its current condition. Where a ladder is deemed to have failed an inspection it must immediately be removed from service.

64. There are very few types of repairs that can be carried out that would allow the ladder to retain its integrity. Therefore when a ladder has been damaged, it is likely the best course of action it to dispose of it. Where a ladder is to be disposed of, it shall be cut from top to bottom through the middle of the rungs and not cut through the stiles as the ladder can often find its way back into use as a shortened version. (See Diagram 8).

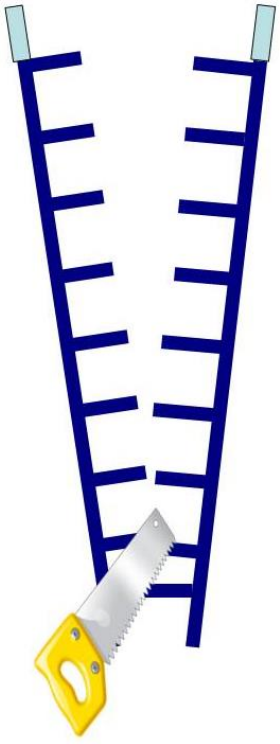


Diagram 8: Defective ladder must be destroyed by cutting through rungs as illustrated

Handling Ladders

65. When transporting ladders to and from site they must be fixed securely to the vehicle, where ladders are placed on roof racks they should be stacked in such a manner that they are securely fixed both to the vehicle and each other. They must not be stacked to such a height that they are liable to topple as a single unit or cause the vehicle to be unstable. (See Diagrams 9 & 10).
(Please note that guidance should *be sought from the vehicle manufacturer regarding the maximum load that can be carried on the roof).*

Diagram 9:
Illustration showing the ladders stored incorrectly

Diagram 10:
Illustration showing the ladders stored correctly

66. When transferring ladders from and onto a vehicle the operatives should not be exposed to the potential of a fall from the vehicle.
(Refer also to current HSE guide Information sheet 'Preventing slips, trips and falls from vehicles')

67. When transferring the ladders from the vehicle to the place of work the operative should be aware of the need for the correct manual handling.

68. Please note that particular care must be taken when transferring ladders in the vicinity of live plant or live electrical hazards such as overhead cables and open type transformers. This must be addressed in an appropriate risk assessment.

69. When not in use, ladders should be stored in a secure area which is clean and well ventilated, away from accidental damage and sources of extreme heat and in accordance with the manufacturer's instructions.

(Refer also to the Manual Handling Operations Regulations 1992, (as amended))

Laddering: All Structures

70. Before any ladders are installed, an inspection should be carried out to ensure that the structure the ladders are being attached to and the base where the ladders will stand upon are suitable for the purpose.

71. Consideration should be given before installing the ladders as to the preferred route the vertical ladder track should take allowing for the need to avoid obstructions which can make laddering a structure more difficult.

72. On no account should ladders be attached to fittings or components or any other type of equipment that will not support loads from the ladder system and/or has not been specifically designed for the purpose of attaching and supporting ladders.

73. With regard to the base, a check should be made where this is located at ground level to confirm that the stiles can be set on a firm level surface and that there are no voids, live services or other hazards beneath this position.

74. Roofs and similar type structures will not necessarily be capable of withstanding the forces that point or other associated loads generate.

75. Where the bottom ladder is to be located on top of a structure or roof or similar, an inspection should be carried out where possible of the underside to ensure the roof cladding and its support structure is capable of withstanding the loads applied by the ladder in use, and people walking on the roof with or without tools and materials to reach the ladder. A spreader device such as a wooden board should also be considered beneath the bottom ladder to spread the load on the roof and prevent damage of same.
If there is any doubt about the strength of the roof cladding or its supporting structure, competent advice should be sought.

76. Care needs to be taken to determine whether a roof surface is fragile, or whether there are fragile elements such as roof lights in the proximity of the access route and ladder position. If there are and access needs to be taken over such roofs then appropriate precautions need to be taken to prevent falls through the roof. Reference should be made to HSG33 - Health & Safety in Roof Work and Advisory Committee for Roofwork (ACR) publication ACR [CP] 002; 2012 ‘Safe working on fragile roofs and roofs with fragile elements’.

77. Before the first ladder is attached to the structure, the place where the ladder will be located should be level. Where this is not the case then modifications should be carried out to level it off by the means of packing or similar. The packing should be designed so as not to become dislodged during the period that the ladders will be in place. Where this cannot be achieved i.e. a sloping roof, then the base ladder should be made secure and the stiles made vertical and plumb by other means before use.

All Structures: Lashings (used to connect the ladders to the anchor fixing)

78. **Note:** Calculations to support this guide for laddering should be used to determine the imposed loading on the fixing and, by association, the lashings used to secure the ladders to the fixing. It is recommended that lashings used for steeplejack ladders have a minimum factor of safety of 7 times the intended load to give a comfortable margin for deterioration in service. . (i.e. If the intended imposed load = 1 kilonewton (kN) then the selected lashing material must have a certified minimum breaking force of 7 kilonewtons (kN) Whilst it is recognised that rope lashings from different materials will vary significantly in terms of minimum breaking strain it is unlikely that 6 mm diameter rope lashings will give a satisfactory safety margin. Due consideration must also be given to the stability of fibre rope lashing materials under exposure to Ultra Violet light when in service in relation to the time they are likely to remain in use. Nylon ropes, as in BS EN ISO

1140:2012 Fibre ropes. Polyamide, are much more stable under U.V. exposure and are more suitable for long term or multiple usage.
Polypropylene ropes **(BS EN ISO 1346)** are susceptible to degradation under U.V. light but may be suitable for short term single use duties providing site staff are made aware of the shortcomings of the material and procedures exist to ensure lashings are discarded at the appropriate time.

79. Where rope lashings are used to connect the ladder to the anchor fixing or structure, they must be of adequate strength and impervious to any substance which may be present and can affect its integrity.
The recommended method for securing a ladder fitted with stand-off arms to a fixing using a lashing is shown in diagrams 11 to 14 below.

Diagram 11: Typical section through unfixed ladder

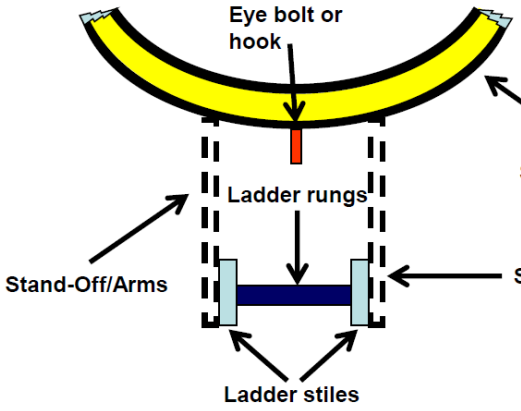
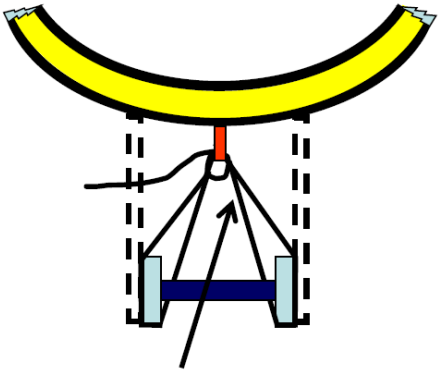


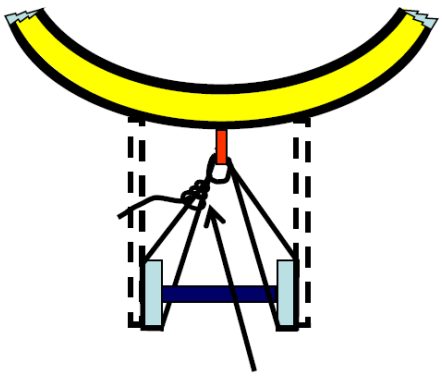
Diagram 12: Ladder fixing step 1

Diagram 13: Ladder fixing step 2



Lashing then taken around second stile before being passed back through anchorage

Diagram 14: Ladder fixing step 3



Lashing secured with three half hitches made off to first loop around stile

80. Where the structure being laddered radiates heat, wire rope lashings should be used in preference to fibre rope lashings.

81. Wire rope lashings should be rated for the loads which will be imposed when in use and identification should be present on the rope which shows the safe working load or provides sufficient reference that the rating can be identified by other means. **Reference** should **also be made to BS EN 10264-2:2012 (Wire Ropes)**

82. Where wire rope lashings are used with aluminium ladders during electric welding on a steel stack, it should be noted that in certain conditions arcing can take place through the wire ropes causing the core to melt and the rope to fail.
Wire ropes should not be used in these circumstances unless it can be demonstrated that adequate precautions have been taken to prevent damage to the wire ropes.
This must be identified through a risk assessment.

83. Where permanent anchors are not present on structures such as steel chimneys and lead spires, ladders have previously been installed by passing lashings which are fixed to one side of the ladder around the structure and fixed back to the other side of the ladder. This is not recommended as it does not provide sufficient lateral support and the affect of weather/wind can cause lashings to become loose and unsecure. It is recommended therefore to use permanent anchors where it is reasonably practicable.

All Structures: Anchors

84. Note: Where reference is made to fixings and anchors you should consult with the Guidance note 'Anchors for Steeplejacking' as compiled by ATLAS and the Construction Fixings Association. This gives details on the selection of anchors, establishing the anchor performance in the base anchoring material, and proof testing of anchors.
In addition calculations should be carried out to determine the loads on ladders, modular scaffold frames and any fixings used.
Example calculations are available on the ATLAS website.

All Structures: Anchor Patterns

85. Ladder sections must always be secured at a maximum interval of 1.55 metres.

86. Where permanent anchors of known adequate structural strength and integrity are in place, then a ladder section may be initially secured to one lower anchor to facilitate the installer partially ascending the ladder, beyond the lower anchor, to attach to the second higher anchor for that ladder.

87. Where temporary anchors are used to secure a ladder then a degree of redundancy should be built in and the installer must never ascend or partially ascend a ladder secured to only one temporary anchor.

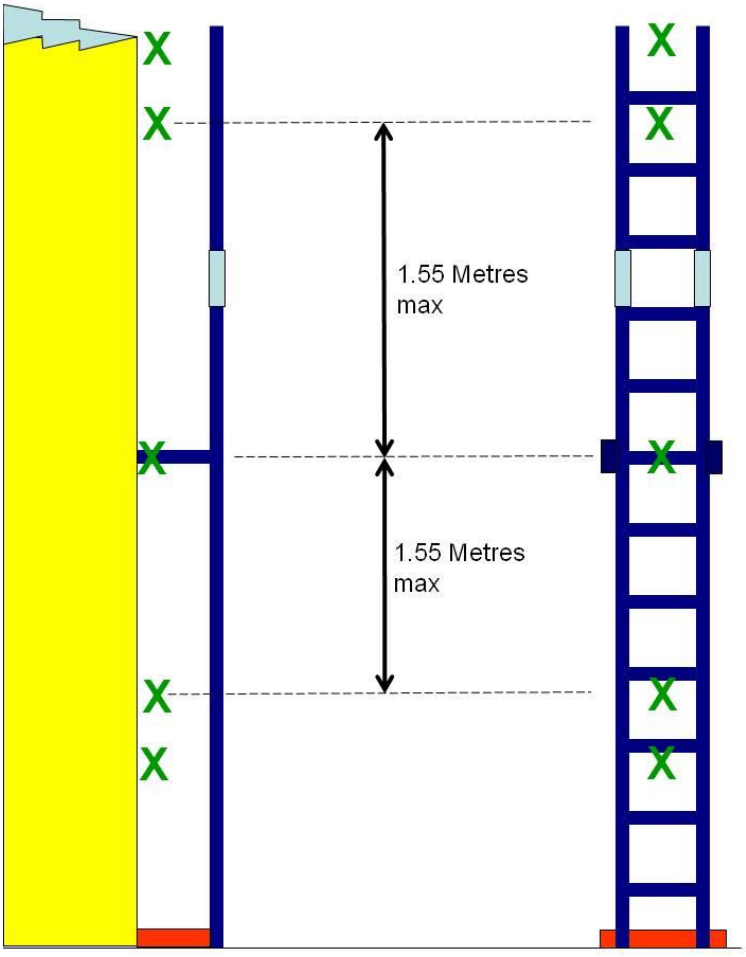


Diagram 15: Pattern for temporary ladder anchors.

88. It is strongly recommended therefore that a minimum of two temporary lower anchors should be installed at the base of each ladder section (shown as **X** in figure 15) prior to the installer partially ascending the ladder, beyond the lower anchors, to install the temporary upper anchor for that ladder.
The bottom anchor location will be determined on the basis that the distance between each anchor will not exceed 1.55 metres.
(Refer to manufacturer's data for anchor characteristics/performance).

All Structures: Laddering with Permanent Anchors

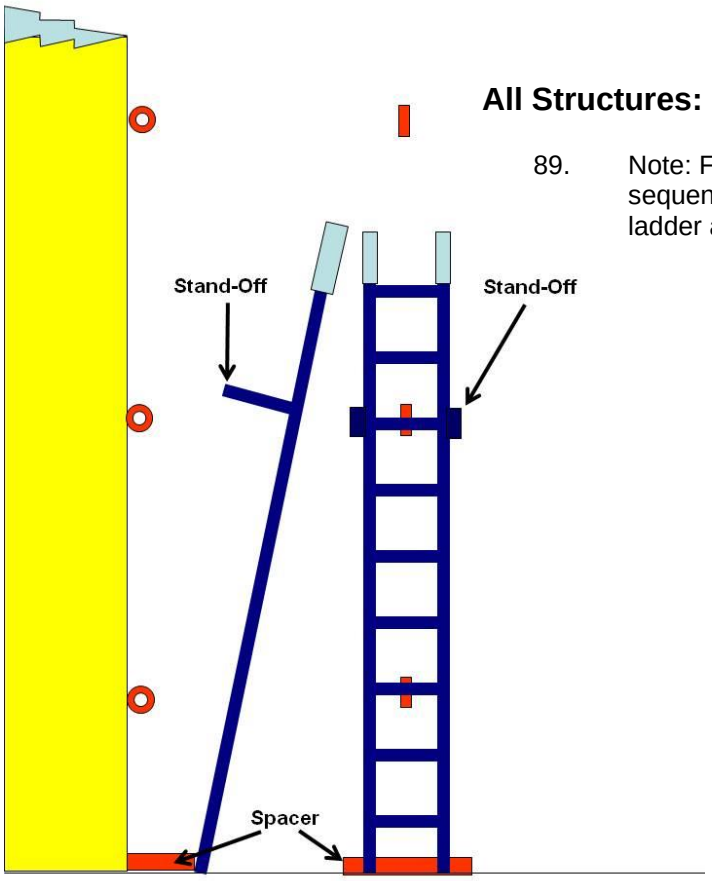


Diagram 16: Arrangement for installing base ladder using permanent anchors. Eye-Bolts are shown in place but are usually required to be installed during laddering and removed along with the ladders. Both spacer and stand-offs are shown for illustration.

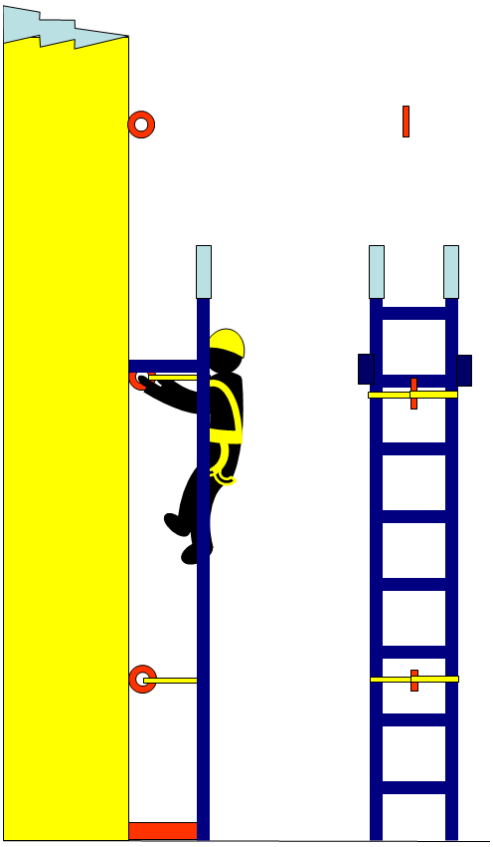


Diagram 17: Installing base ladder in position by securing to top permanent anchor.

89. Note: For explanation purposes in the following laddering sequences, Operative 1 will be on the ladder installing the ladder and Operative 2 will be assisting from ground level.

90. Where the structure is taller or has obstructions etc. the number of operatives should be increased accordingly as the height of the climb or the difficulty in manoeuvring around an obstruction can be more physically demanding. This must be assessed through a risk assessment.

91. Please note that all operatives who will be working at height during this operation will require personal fall protection measures to be in place. (See Appendix 1, Use of personal fall protection)

92. This procedure explains the laddering sequence where permanent anchors are already installed and in a single line with two attachments vertically per ladder. Each ladder will have a stand-off mechanism in place fixed to the top half of each ladder. *Refer also to BS 7883:2005 Code of practice for the design, selection, installation, use and maintenance of anchor devices conforming to BS EN 795*

93. The first ladder (base) should be installed in position by attaching the bottom anchor bolt to the first ladder by means of lashings.

94. Please note that where no bottom stand-offs are being used a spacer should be placed between the structure and the base of the ladder i.e. a scaffold board which will prevent the ladder from moving inwards to the structure. (See Diagram 16).

95. The ladder is secured to the bottom anchor by reeving the lashing through the eyebolt, around the outside of the stile, returned through the eyebolt, back around the opposite stile, returned to the eyebolt and made suitably secure. All subsequent anchors should be attached using the same method. (See Diagrams 11 to 14).

96. Stand-offs should be level and secured so that they will not become loose while the ladder is in use. They can also become loose when the ladders are being removed therefore particular attention should be paid before the lashings securing the ladders are removed.

97. Operative 1 will now ascend the ladder and connect the next anchor bolt to the top of the first (base) ladder in line with the top stand-offs. (See Diagram 17).

98. Please note that personal fall protection/arrest measures should be provided at all times during the installation/removal of the ladders (and also during the use of the ladders, but then a static safety line should be installed). There may be a permanent fall protection system in place that could be used, but there are caveats as explained in Appendix 1 clause 2. Otherwise, there is a need for temporary fall protection measures to be put in place, as outlined in Appendix 1.

99. Operative 1 positioned on the uppermost ladder should place his leg through the ladder rungs for added security. (See illustration 18).

Diagram 18: Operative locates leg through ladder rungs whilst working on the ladders such as installing/removing anchors and ladders. (Illustrative purposes only)

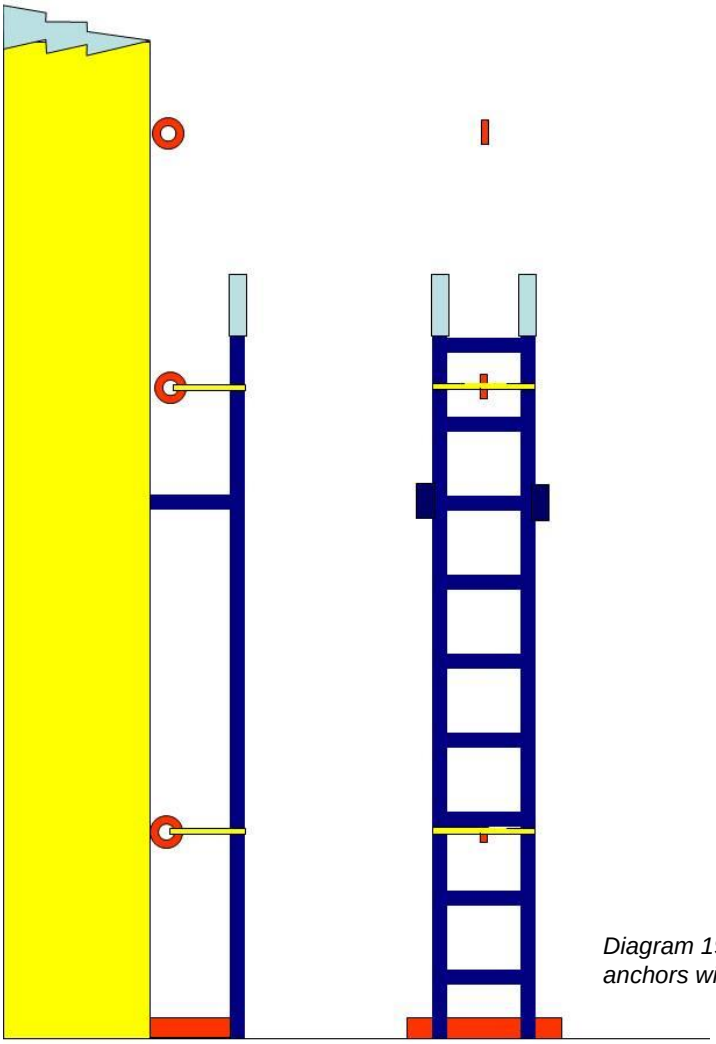


Diagram 19: Base ladder in position using permanent anchors with spacer in place instead of bottom stand-off.

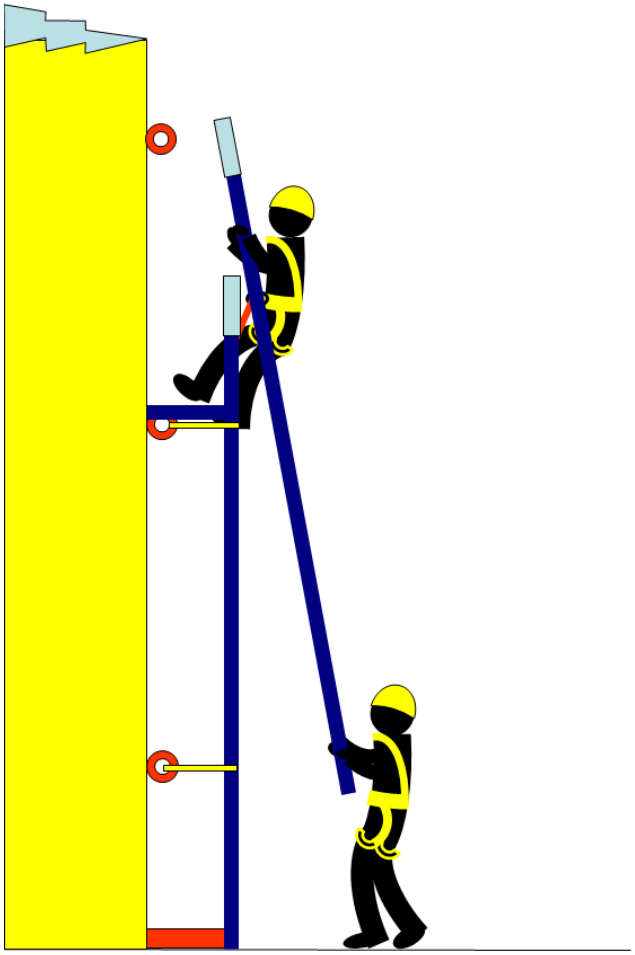


Diagram 20: Installing second ladder in position using permanent anchors.

100. Once the first ladder is installed and secured to the structure, Operative number 1, still located on the bottom ladder, is handed the second ladder by Operative 2 who is based at ground level. (See Diagram 20).

101. Operative 1 now locates the bottom of the second ladder into the sockets or hoops at the top of the first ladder. It should be noted that only one person should ever be on the top ladder. (See Diagram 21).

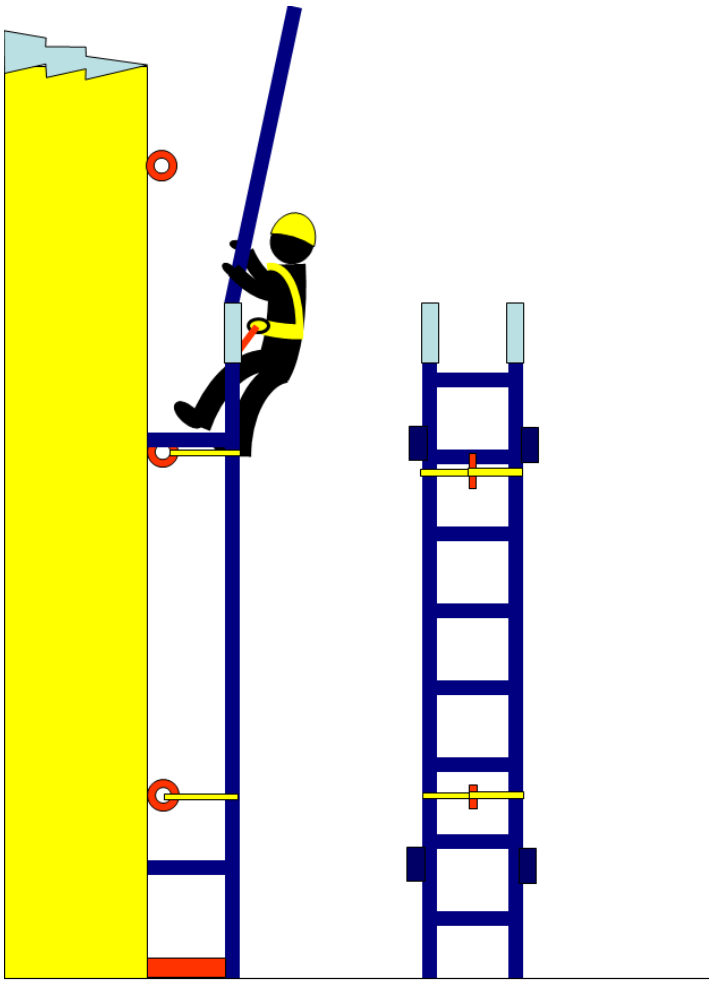


Diagram 21: Installing second ladder in position using permanent anchors.

102. Operative 1 now connects the next anchor bolt to the base of the second ladder as described in clause 90.

103. Operative 1 now ascends towards the top of the second ladder remaining connected by safety line or lanyard at all times. Refer also to the 'Personal fall protection – Laddering' section in Appendix 1.

104. Operative 1 now connects the next anchor to the top of the second ladder.

105. A third ladder is now handed to Operative 1 by Operative 2 where the process is then repeated.

106. As the height of the ladders being installed increases, the next ladder to be installed is transferred from the ground to Operative 1 by means of a rope and pulley system. The anchor for this rope and pulley system can either be attached to a ladder which has already been secured or fixed to an independent anchor installed as the operative ascends the structure.
If the hoisting equipment is attached to the ladder you must ensure the ladder is capable of withstanding the imposed loading. (See diagrams 22 & 23).
Powered winches 'must never' be connected to the ladder system.

107. As Operative 1 receives each ladder the safety line is transferred once the next ladder has been installed. Refer also to the 'Personal fall protection – Laddering' section in Appendix 1.

108. This process continues until the ladders extend to the point where the ladder run terminates.

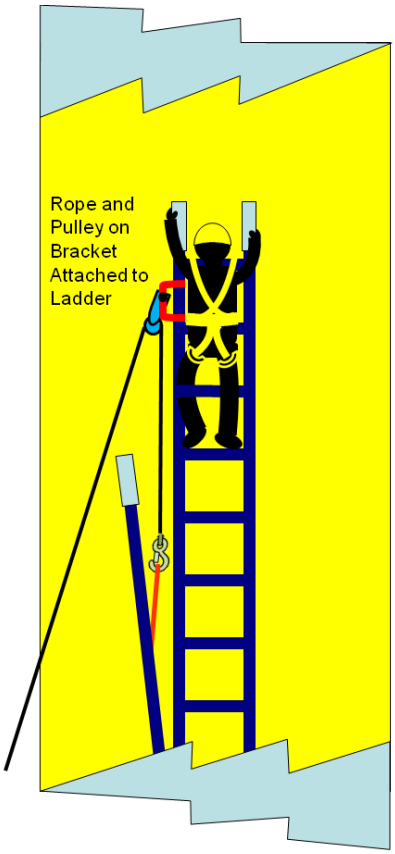


Diagram 22: Transferring ladders using rope and pulley system attached to ladder. (Illustrative purposes only)

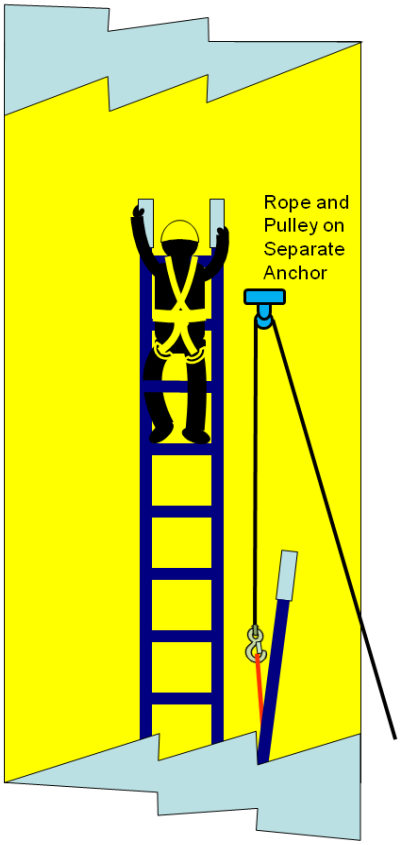


Diagram 23: Transferring ladders using rope and pulley system secured independent of ladder. (Illustrative purposes only)

All Structures: Laddering with temporary anchors

109. Note: For explanation purposes in the following laddering sequences, Operative 1 will be on the ladder installing the ladder and Operative 2 will be assisting from ground level.

110. Where the structure is taller or has obstructions etc. the number of operatives should be increased accordingly. This must be assessed through a risk assessment.

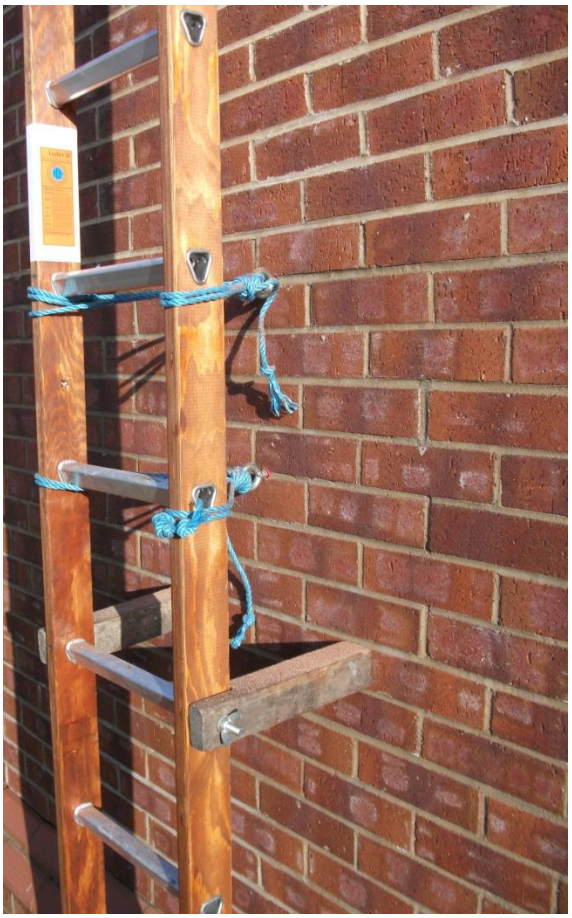
111. Please note that all operatives who will be working at height during this operation will require personal fall protection measures to be in place. (See Appendix 1, Use of personal fall protection)

112. This procedure explains the laddering sequence where there are no permanent anchors available and temporary anchors will need to be installed with three attachments per ladder. Two anchors are located vertically at the base of the ladder and one at the top in line with the top stand-offs. (See Diagram 15). Each ladder will have a stand-off mechanism in place fixed to the top half of each ladder.

113. Two anchors are drilled (anchors 1 & 2) and installed as per the guidance 'Anchors for Steeplejacking' as compiled by ATLAS and the Construction Fixings Association.

114. The first ladder (base) should be installed in position by attaching the newly installed bottom anchors to the first ladder by means of lashings or similar close to the bottom stand-offs.

115. Please note that where no bottom stand-offs are being used a spacer should be placed between the structure and the base of the ladder i.e. a scaffold board which will prevent the ladder from moving inwards to the structure.



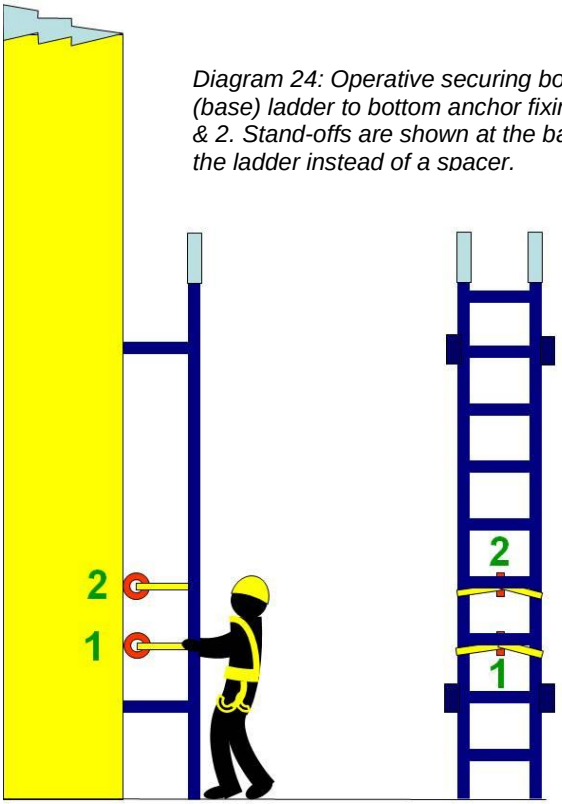


Diagram 24: Operative securing bottom (base) ladder to bottom anchor fixings 1 & 2. Stand-offs are shown at the base of the ladder instead of a spacer.

116. The ladder is secured to the bottom anchors by reeving the lashing through the eyebolt, around the outside of the stile, back through the eyebolt, then back around the opposite stile, back to the eyebolt before being made suitably secure. All subsequent anchors should be attached using the same method. (See Diagrams 11 to 14 and 24 & 25).

117. Stand-offs should be level and secured so that they will not become loose while the ladder is in use.

118. Operative 1 will now ascend the first ladder and drill and fix an anchor (anchor 3) in line with the top stand-offs.

119. Please note that personal fall protection/arrest measures should be provided at all times during the installation/removal of the ladders (and also during the use of the ladders, but then a static safety line should be installed). There may be a permanent fall protection system in place that could be used, but there are caveats as explained in Appendix 1 clause 2. Otherwise, there is a need for temporary fall protection measures to be put in place, as outlined in Appendix 1.

120. Operative 1 will now connect the top anchor (3) to the first (base) ladder in line with the top stand-offs.

121. Operative 1 now installs two anchors (anchors 4 & 5) near the bottom of where the second ladder will be located. (See Diagram 26).

122. Operative 1 positioned on the uppermost ladder should place his leg through the ladder rungs for added security. (See illustration 18).

123. Once the 4th and 5th anchors are installed and secure in the structure, Operative 1, still located in the same position on the bottom ladder is handed the second ladder by Operative 2 who is based at ground level.

124. Operative 1 now locates the bottom of the second ladder into the sockets or hoops – at the top of the first ladder. (See Diagram 27).

125. Operative 1 now connects the second ladder to the recently installed bottom anchors.

126. Operative 1 now ascends towards the top of the second ladder remaining connected by safety line or lanyard at all times. Refer also to the 'Personal fall protection – Laddering' section in Appendix 1

127. Operative 1 will now drill and fix a single anchor in line with the top stand-offs.

128. Operative 1 having now fixed the top anchor near the top of the second ladder connects the ladder to this anchor.

129. A third ladder is now handed to Operative 1 by Operative 2 where the process is then repeated.

130. This process continues until the ladders extend to the top of the structure.

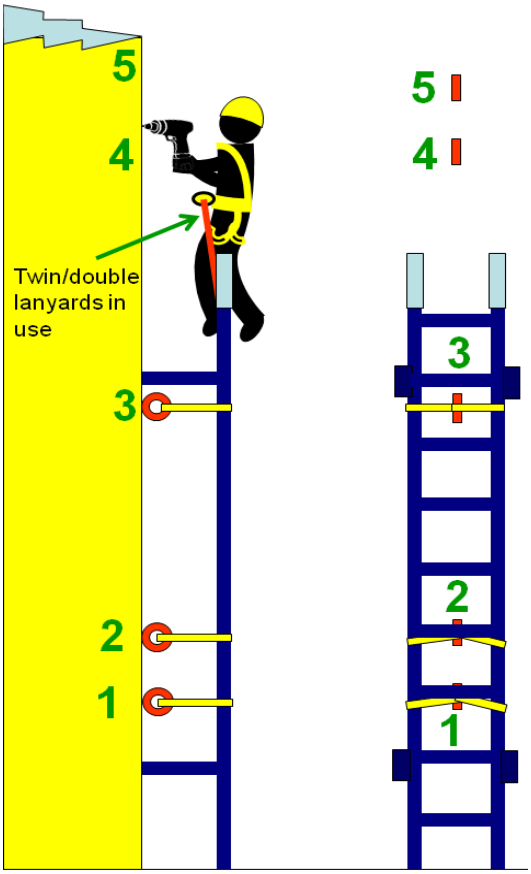


Diagram 26: Operative drilling and fixing anchors (4 & 5) to accommodate base of second ladder. Stand-offs are shown at the base of the ladder instead of a spacer.

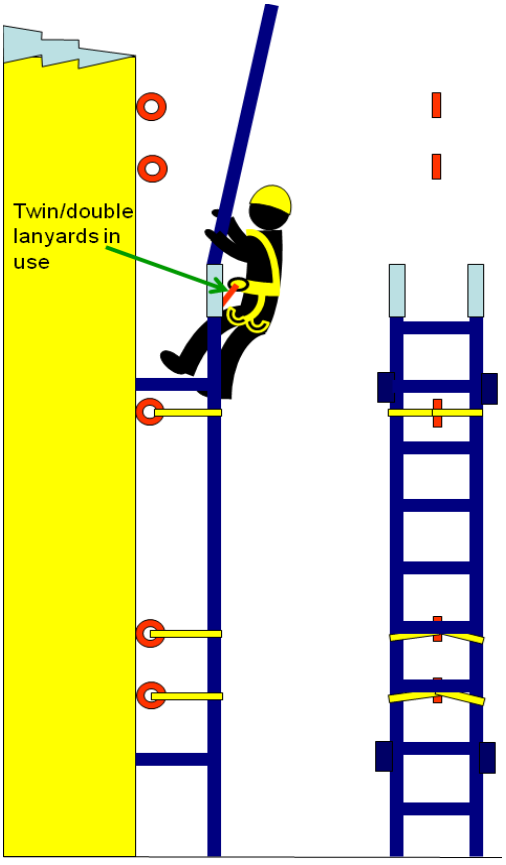


Diagram 27: Operative securing second ladder into bottom (base) ladder.

131. As the height of the ladders being installed increases, subsequent ladders to be installed are transferred from the ground to Operative 1 by means of a rope and pulley system. The anchor for this rope and pulley system can either be attached to a ladder which has already been secured or fixed to an independent anchor installed as the operative ascends the structure. (See Diagrams 22 & 23). **Powered winches 'must never' be connected to the ladder system.**

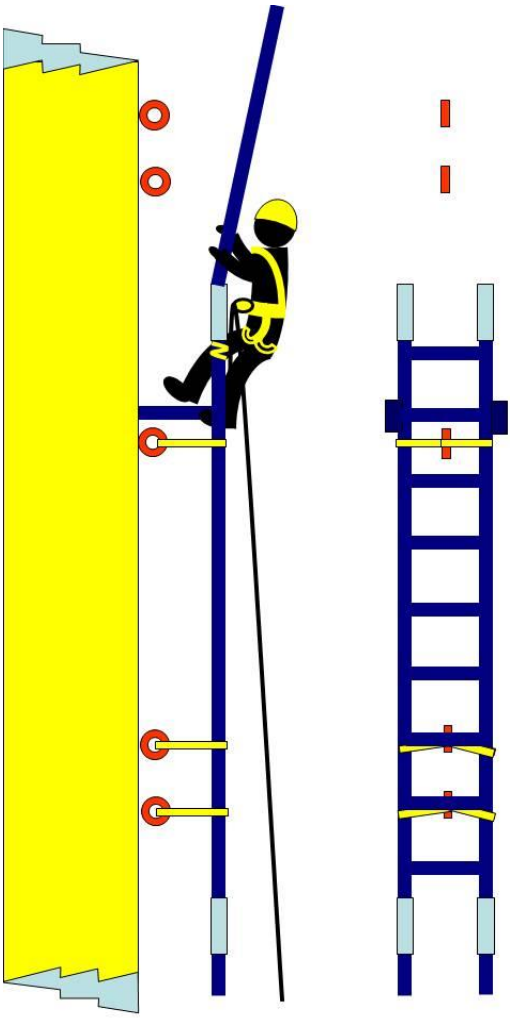


Diagram 28: Continuing the process of installing ladders in position to the top of the structure using temporary anchors with a belay line in place.

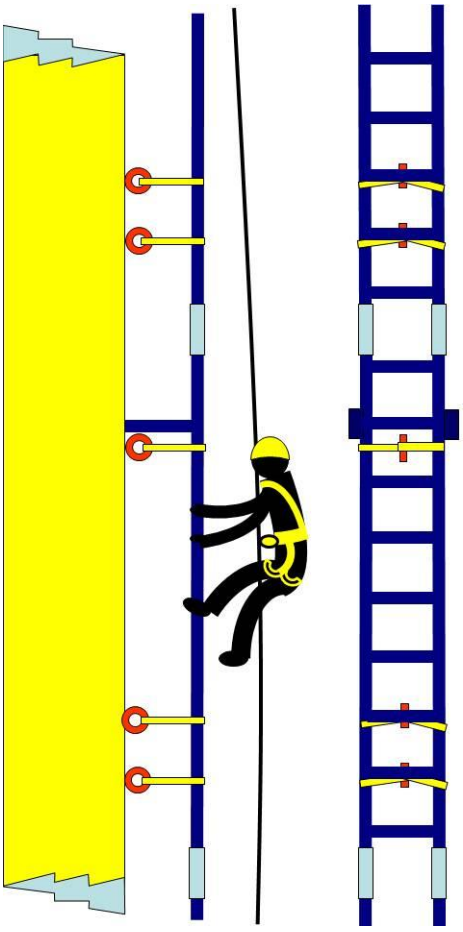


Diagram 29: Even after the ladders are installed, a safety line must be used at all times.

132. Operative 1 ascends to the top of the most recently secured ladder remaining connected by safety line or lanyard at all times. Refer also to the 'Personal fall protection – Laddering' section in Appendix 1. This operation is also carried out to the top of the structure.

Laddering Steel Structures

(See also the Guide to the Inspection of Single Flue Industrial Steel Chimneys prepared by ATLAS)

133. The sequence as described for all structures is carried out for this operation but with additional safeguards as noted below.

Laddering Steel Structures: Permanent Anchors

(See also Recommended Inspection Regime for Permanently Installed Ladder Anchors on Steel Chimneys below)

134. It is recommended that a closed eye type fixing is used. Where hooks have previously been installed, consideration should be given to replacing with closed eye type anchors.

135. Where anchors or fixing points are permanently installed they should be checked before use. In the case of steel hooks they should be examined to satisfy the examiner of the integrity of the hook and that it is adequately secured to the structure.

136. Where the anchor is welded to the structure, a load test should be carried out to confirm the integrity of the fixing and its capability to withstand the load. It may be necessary to test each anchor prior to use. Where there is doubt about their integrity, NDT (non destructive testing) should be carried out. It is recommended that a suitably qualified technical advisor or similar is consulted for advice.

137. Where steel bosses have been installed, the eyebolt should be inserted and then checked to ensure the integrity of the fixing and that it is adequately secured to the structure.

138. Once the anchors have been deemed acceptable the first ladder can be installed as described previously in the Laddering all Structures section. However, it will be necessary that each anchor point is checked as the ladders are progressively installed.

Recommended Inspection Regime for Permanently Installed Ladder Anchors on Steel Chimneys

1. Permanent ladder anchors installed to steel chimneys may be original equipment, as installed by the chimney manufacturer, or retro-fitted by specialist maintenance contractors.

2. Chimney inspection contractors wishing to make use of permanent anchors for securing temporary ladders should attempt to determine nature and condition of the anchors prior to use.

3. Information required before use of permanent anchors should include the time of installation of the anchors, the specification of the anchors, the qualifications of the installer and details of any tests or examinations previously undertaken.

4. The chimney owner must co-operate with the selected chimney inspection contractor in making available any of the information described under Item 3. he may hold

5. If the installed ladder anchors comply with the requirements of BS 3678: 1986 “Specification for access hooks for chimneys and other high structures in steel”, have been installed by a suitably qualified person and have been previously tested and examined, then the appointed inspection contractor may then use the installed anchors providing that a suitably qualified person carries out a visual examination of each anchor as the ladder run is erected prior to loading each anchor.

6. If the installed ladder anchors do not comply with those items listed under Item 5 or the visual examination prescribed under the same item does not prove to be satisfactory then it is recommended that a detailed examination and test programme be undertaken.

7. The recommended detailed examination and test programme is as follows;

7.1 Undertake non-destructive testing (NDT) on the attachment weld between the base anchor and the body of the structure using suitably qualified technicians, prior to loading the anchor. (Use Metal Particle Inspection for mild steel stacks and Dye Penetrant Inspection for stainless steel stacks)

7.2 After initial NDT has been completed on the anchor, apply a proof load equivalent to intended applied load x 2 using a calibrated portable tension tester operated by suitably qualified technician. (Calculation sheets should be provided to indicate applied load)

7.3 Once an anchor has been load tested, undertake further NDT using same techniques as for initial test to ensure that no defects have been induced as a result of the load test.

7.4 Install ladder access to level of highest tested anchor and repeat tasks described under items 7.1, 7.2 and 7.3 on next accessible anchor to allow ladder run to be extended.

7.5 Continue with inspection process described above until all anchors installed to structure have been tested and examined.

7.6 On completion of the inspection process prepare and issue a certificate of test and NDT report to the chimney owner to allow future use of ladders requiring visual examination only as described under Item 5.

8. Normal definitions for suitably qualified staff for inspection of permanent ladder anchors shall apply in that those members of staff deemed to be competent by the Company by virtue of experience and/or training may carry out the works. It is suggested that a PCN or ASNT qualification for NDT would be appropriate along with evidence of training in the use of the portable tension tester by either the equipment manufacturer of an independent body such as the Construction Fixings Association.

Laddering Steel Structures: Temporary Anchors

139. It is recommended that permanent anchors are fitted whenever possible to steel chimneys and structures etc.
Please refer to current guidance and relevant codes of practises and standards including but not limited to ‘Anchors for Steeplejacking’ as compiled by ATLAS and the Construction Fixings Association and BS 4211:2005+A1:2008
Specification for permanently fixed ladders.

140. It is recommended that a closed eye type fixing is used

Laddering Concrete Structures

141. The sequence as described for all structures is carried out for this operation but with additional safeguards as noted below.

Laddering Concrete Structures: Permanent Anchors

142. Where anchors or fixing points are already permanently installed they should be checked before use. In the case of steel hooks or eyebolts they should be examined to satisfy the examiner of the integrity of the fixings and that they are adequately secured to the structure. Where hooks have previously been installed, consideration should be given to replacing with closed eye type anchors.

143. Where sockets are installed but not the fixings, it is essential to ensure the threads of the eyebolt being fitted are compatible with the threads of the sockets already installed.

144. Once the anchors have been deemed acceptable the first ladder can be installed as described previously in the Laddering all Structures section. However, it will be necessary that each anchor point is checked as the ladders are installed.

Laddering Concrete Structures: Temporary Anchors

145. Please refer to 'Anchors for Steeplejacking' as compiled by ATLAS and the Construction Fixings Association. This provides guidance on good practice for the safe use of anchors and fixings which are used in the laddering process.

Laddering Brick Structures

146. The sequence as described for all structures is carried out for this operation but with additional safeguards as noted below.

147. It should be noted that due to the often variable adverse conditions which can result in states of dilapidation and disrepair, on brick stacks and where in particular the condition of the structure is suspect, single anchor fixings should not be relied upon and consideration should be given to multiple anchors (4 No. minimum, i.e. 2 upper and 2 lower per ladder). Refer to the guidance 'Anchors for Steeplejacking' as compiled by ATLAS and the Construction Fixings Association In addition consideration needs to be given as to whether laddering can be safely carried out or an alternative means of access such as scaffolding should be used.

148. The guidance for multiple anchors is highly recommended at the top of the structure where a thorough inspection must be carried out prior to placing any load on the structure.

Laddering Brick Structures: Permanent Anchors

149. Where anchors or fixing points are already permanently installed they should be checked before use. In the case of steel hooks or eyebolts they should be examined to satisfy the examiner of the integrity of the fixings and that they are adequately secured to the structure. Where hooks have previously been installed, consideration should be given to replacing with closed eye type anchors.

150. Where sockets are installed but not the fixings, it is essential to ensure the eyebolt threads being fitted are compatible with the threads of the sockets already installed.

151. Once the anchors have been deemed acceptable the first ladder can be installed as described previously in the Laddering all Structures section. However due to the often variable adverse conditions experienced with brick stacks it is vital that each anchor point is checked as the ladders are installed.

152. Where there is any doubt about the integrity of an anchor on a brick stack it must not be used.

Laddering Brick Structures: Temporary Anchors

153. Please refer to 'Anchors for Steeplejacking' as compiled by ATLAS and the Construction Fixings Association. This provides guidance on good practice for the safe use of anchors and fixings which are used in the laddering process.

154. Anchor bolts are the preferred and recommended option to secure ladders. Where the more traditional system of "pins and dogs" are used it should be noted that no test results are currently available from ATLAS therefore if this system is used it is up to the installer to justify and substantiate the safe working loads and design capability of this system.

    Please note where ladders are fixed to existing parts of the structure (such as steel bands) checks should be made to ensure these will be suitable for that purpose.

Laddering Stone Structures

155. The sequence as described for all structures is carried out for this operation but with additional safeguards as noted below.

156. It should be noted that due to the often variable conditions experienced with stone structures and where in particular the condition of the structure is suspect, single anchor fixings should not be relied upon and consideration should be given to multiple anchors (4 No. minimum, i.e. 2 upper and 2 lower per ladder). In addition consideration needs to be given as to whether laddering can be safely carried out or an alternative means of access should be used.

157. The guidance for multiple anchors is highly recommended at the top of the structure where a thorough inspection must be carried out prior to placing any load on the structure.

Stone Structures: Permanent Anchors *(See also clause 81)*

158. Where anchors or fixing points are already permanently installed they should be checked before use. In the case of steel hooks or eyebolts they should be examined to satisfy the examiner of the integrity of the fixing and that it is adequately secured to the structure.

159. The stone should be carefully examined for any sign of cracking, spalling or laminating. Where this is evident further investigations should be carried out to discover the extent of any problem which may affect the security or stability of the anchor.

160. Once the anchors have been deemed acceptable the first ladder can be installed as described previously in the Laddering all Structures section. However, it will be necessary that each anchor point is checked as the ladders are installed.

Stone Structures: Temporary Anchors

161. Please refer to ‘Anchors for Steeplejacking’ as compiled by ATLAS and the Construction Fixings Association. This provides guidance on good practice for the safe use of anchors and fixings which are used in the laddering process.

162. Anchor bolts are the preferred and recommended option to secure ladders. Where the more traditional system of “pins and dogs” are used it should be noted that no test results are currently available from ATLAS therefore if this system is used it is up to the installer to justify and substantiate the safe working loads and design capability of this system.

Stone Structures: Churches Laddering

163. The sequence as described for all structures is carried out for this operation but with additional safeguards as noted below.

164. When laddering at the top of a spire it may be difficult to install a sufficient number of anchors necessary to ensure the ladders are secure, therefore in addition, consideration should be given to the use of lashings around the spire connected to both ladder stiles and linked horizontally. (See diagram 30).

165. When lashings are used in this fashion it is essential to regularly check the tightness and integrity over the course of a contract, particularly after high winds.

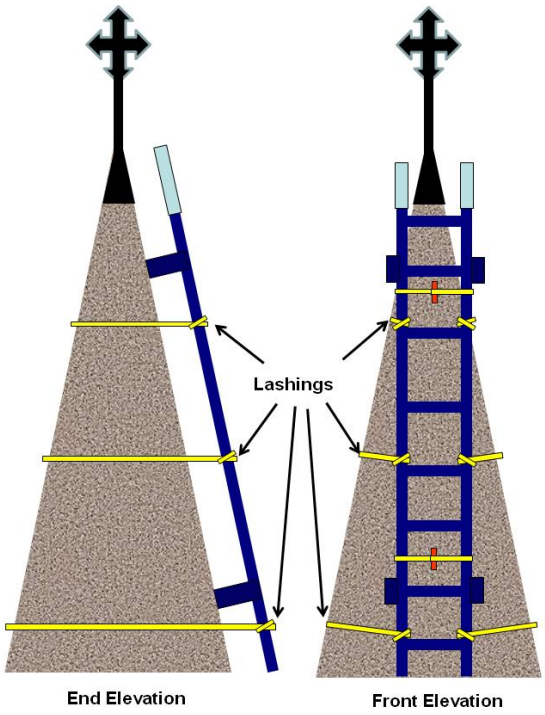


Diagram 30: Securing ladders using lashings where anchor installation may be restricted. (Illustrative purposes only)

Stone Structures: Churches Laddering Internal

166. The sequence as described for all structures is carried out for this operation but with additional safeguards as noted below.

167. More than one person should not be on a ladder run internally until the ladders have been completely installed up to the point where the ladder run will terminate and two people must never be on the top ladder.

168. The second operative should be located at the floor of the belfry or on an additionally installed platform.

169. When laddering a spire internally, care must be taken during the ascent to check the condition of the cross-trees and any other part of the structure that may present a hazard for the operatives.

170. Where internal laddering of a spire entails the ladders being installed against a slope leaning inwards, consideration should be given to installing anchors alongside the ladder track being installed and an additional safety line incorporated. This will act as fall protection back-up to the operative installing the ladders.
(See also appendix 1).

171. This safety line should incorporate a device that allows an operative at a lower level to be able to lower the operative should they fall. This is necessitated because of the difficulty of being able to rescue the operative.

Oversails and Obstructions

172. When laddering ornate or irregular shaped structures such as, cooling towers, church spires, towers and ornamental brick chimneys, installation of the ladders can be obstructed where parts of the structure project out from the main face. In this situation consideration should be given to splicing the ladder below the obstruction to allow the run of ladders to continue. Where this solution is used, consideration should be given for the use of multiple sets of anchors i.e. two sets of two to be installed to ensure the bottom spliced ladder has adequate support.
(See diagrams 31 & 32)

173. The top ladder should form the outer part of the splice and the two ladders joined together using a minimum of three rope lashings over a minimum of five rungs. The ladders should also be joined by four lashings on the ladder stile.
(See diagram 31)

174. Splicing must only be carried out using specialist access type ladders and not others such as conventional leaning ladders.

175. Lashings used when splicing ladders may be either fibre or wire rope but should be suitable for purpose and capable of withstanding loads imposed with a minimum of 2 turns for the stiles plus fully wrapped for the rungs.

176. Where the obstruction presents an unacceptable level of risk to the operatives installing the ladders or doubts exist about the stability of the feature to be negotiated, consideration should be given to the installation of a modular scaffold frame or similar to be installed below the feature. The frames should be positioned so that they will accommodate a vertical ladder and project far enough from the face of the structure to allow the ladder to safely pass the obstruction.

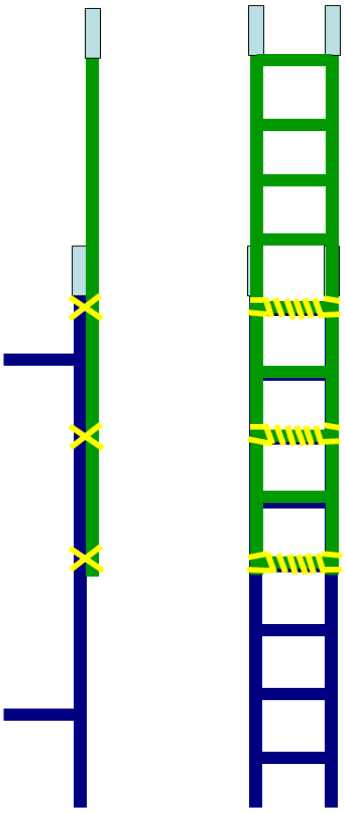


Diagram 31: Splicing ladders where adequate anchoring may be in doubt. Where this occurs the supporting ladders will require 4 No. minimum anchor fixings. (Illustrative purposes

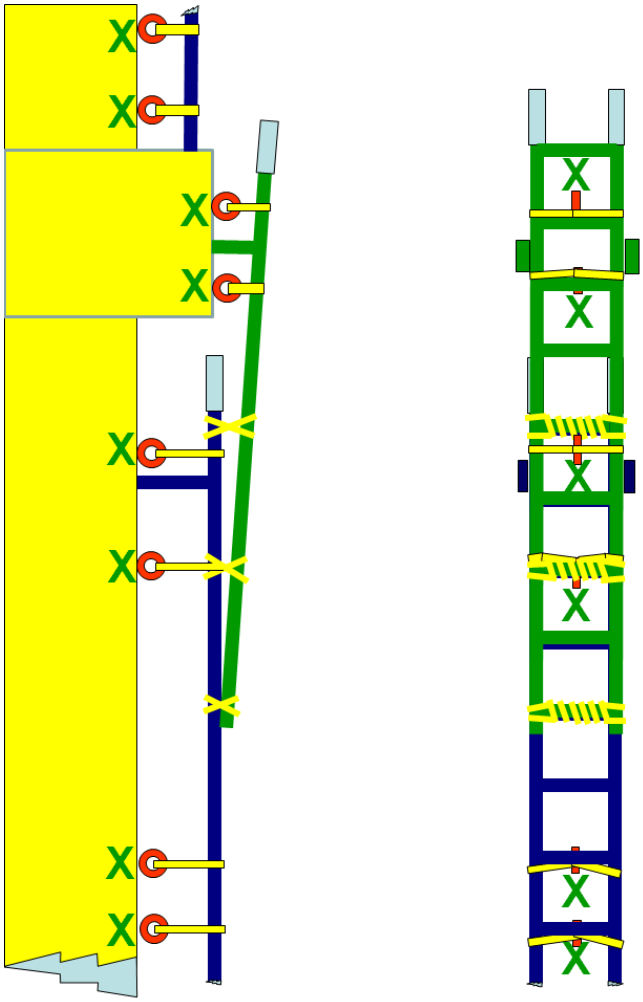


Diagram 32: Splicing of ladder to accommodate obstruction. (Illustrative purposes only)

177. The modular frames should be boarded out to allow the ladder to stand on the scaffold platform. Before any load is put onto the ladder it should also be fixed to the structure by two anchors fixed vertically in line with the bottom stand-off. Loading from the ladder on the scaffold needs to be considered.

178. Where ladders are not socketed to other ladders for support, such as when an obstruction (ie church pinnacle) prevents a continuous ladder run consideration should be given to additional anchors such as the mid-point or modular scaffold frames.

179. Where a modular scaffold is installed, other factors affecting safety need to be considered. These are not covered in this guide but include the distance an anchor can be placed in relation to the edge or top of the structure and the dangers of overloading from powered winches. It is essential these are addressed in a risk assessment.
Modular scaffolds will be classed as special scaffolds and as such must be designed and structural calculations made. Consideration should be taken of any additional loading on the scaffold that may be the result of a vertical load from the ladders.

For further information on modular scaffolds, see the Guidance Note:
Anchors for Steeplejacking (2013) prepared by ATLAS and
available on the ATLAS website.

Ladder Usage

180. Once all the ladders have been installed any persons using the ladder access system must be connected to a safety line (or second anchor) at all times. Refer also to the 'Personal fall protection – Laddering' section in Appendix 1 with emphasis on static safety lines.

181. The maximum number of operatives who can safely use the safety line must be identified, taking into account manufacturer's guidance, all components, including the anchor system and the maximum number of persons allowed recorded and communicated to all stakeholders and must not be exceeded.

182. If more than one safety line is used in the same location, they must be clearly identified to prevent the approved number of persons using them are not exceeded

Ladder Removal: All Structures

(All safety procedures to prevent or arrest a fall which are necessary during the installation and use of the ladders must be maintained during dismantling)

183. Ladders are normally removed in reverse order, however the removal method is not necessarily the opposite of the installation as the risk can have changed following installation.
For example where ladders have been installed, alterations or additions to the structure carried out during the project may create an obstruction that was not present during the installation.
The removal method should always therefore be reviewed to take into account any changes that may result in creating a new hazard.
This should be addressed in the risk assessment and planning stages.

184. Stand-offs can become loose when the ladders are being removed therefore particular attention should be paid to them before the lashings securing the ladders are removed.

185. Once the ladder has been disconnected from the anchors, operatives must on no account go back onto that ladder and must never rely on the ladder stile sockets or hoops as a sole means of security. This remains the case even on the lower ladders.

186. When removing anchors and/or fixings from the structure during dismantling of ladder system, anchors etc., should remain securely tied to the ladders or lowered separately in a suitable container. Whatever technique is used the anchors and/or fixings must be kept secure at all times and not allowed to fall.

Communication

187. A competent and experienced access specialist team can communicate quite effectively and with hand signals during the operation of erecting and dismantling the temporary specialist access ladders, however depending on the team and the heights involved radio contact should be considered and used in most circumstances. A risk assessment should be used to determine an appropriate safe system.

Rescue: A rescue procedure must be in place for all access systems.

(See appendix 3)

Appendix 1 - Use of Personal Fall Protection Systems

What is personal fall protection equipment?

1.1. There are several types of personal fall protection systems and equipment. Users of these systems require high levels of training and appropriate close supervision:

- **Work restraint** systems and equipment will include a lanyard which must be adjusted, or set, to a fixed length to prevent the user physically getting to a place where they could fall, eg a roof edge or fragile surface. Also likely to be used when operatives are installing access systems such as scaffold platforms and gaining access to the ladder base if located on a roof.
  A work restraint system may comprise fall arrest equipment, work positioning equipment, harness with a lanyard of limited length. An energy absorbing lanyard of the correct length may be used provided that it will not be subjected to a force that could cause the energy absorber to begin to deploy. Some restraint systems incorporate a manually adjustable lanyard or anchor line to vary the limit of travel. Extreme care should be taken when using such as system to ensure that the user does not adjust the lanyard or line such that an unprotected edge can be reached."

- **Work positioning** systems and equipment enable the user to work in tension or suspension to prevent or limit a fall, eg a linesman. A back-up system is needed in case the main support fails. This would be the least preferred option in the specialist access industry as it tends to be used when the operative is working in a single position only and makes multi-positioning using a back-up line or system difficult.

- **Rope access** and positioning systems use two static ropes, a working rope and a safety rope, each secured to a reliable anchor.
  The user's harness is attached to both ropes in such a way they can get to and from the work area and the risk of falling is prevented or limited. This type of system could be used to access the side of a tall structure where other systems cannot be used or are unpractical. This is the preferred access system in the specialist access industry as it can allow horizontal and vertical movement with a safety line in place. This makes it ideal to install and remove equipment where a suitable anchor system can be located above the position where access is required.
  Rope access and positioning systems can also be used for work positioning and fall arrest.

- **Fall arrest** systems and equipment limit the fall distance and impact force of a fall on the user and prevent them hitting the ground. The anchor point should ideally be as high as possible above the feet of the user to limit the distance of the fall.
  Equipment should be regularly inspected for wear and damage.
  Used when moving about on access platforms during installation and dismantling or transferring between the different platform height levels. Although work restraint should be used in preference as the fall is not allowed to take place, fall arrest tends to be used more often. This is mainly because operatives feel it is less restrictive and tend to overlook the difficulties of rescue should a fall occur.
  This sort of practise should be discouraged and the work at height hierarchy considered at all times.

Personal Fall Protection – Laddering

1.2. When installing, altering or removing ladders, access specialists do not normally have the advantage of rope access due to the absence of anchor points above the work area, therefore, harness, lanyard and safety lines are likely to be the safest form or protection. ATLAS have carried out various tests and research into these systems and have concluded that certain types of ladders can have a safety line safely incorporated when carrying out laddering activities.

1.3 These tests have been carried out on three types of ladders by SATRA on behalf of ATLAS to demonstrate the ladder stiles as suitable fall-arrest anchorages for double lanyards and belays. If the same type or similar ladders are used then these tests will apply. If not you may have to carry out your own tests.

- these tests demonstrated that the drop tests were carried out appropriately in compliance with BS EN 795 and were relevant for both anchor scenarios, and;

- the drop tests and report information show that the steeplejack ladder stiles can be safely used as an anchor point for the 2 fall-arrest scenarios.

Full test information is available from ATLAS on their website.

1.4 Occasionally some structures have a permanent fall protection system installed. Where protection is via a track system the various components must be inspected by a competent person as they ascend the structure. Where the fall protection is via a wire or cable system, it should be recognised that the upper suspension point for the cable cannot be inspected during the ascent and therefore the operatives will be attached to a protection system that has not been fully inspected. A risk assessment should therefore be in place which takes into account the potential hazards that may be present in the system and identify a safe means of access. Reference should also be made to any previous inspection reports and account taken of any adverse comments.

1.5 Where fall protection has not been previously provided, a temporary fall protection system should be installed that will provide protection when the ladders are:

- being installed
- whilst using the ladders for access and egress and
- during removal

1.6 There are three options to provide a temporary fall protection system incorporating a safety line when the ladders are being installed and for subsequent access. The first option can take the form of incorporating anchors into the structure and connecting and installing the safety line as the work progresses. If anchors are to be installed they should be tested and the results of the test recorded to ensure that the minimum anchor strength is achieved.

However, the operative installing the anchors and fixings would still need to be protected and is therefore likely to be attached or secured to the ladders or ladders that have already been installed. On that basis it is recommended that consideration be given to the second option which can be utilised at all times.

1.7 The second option involves fixing safety lines to the ladders. This should include a fixing point which needs to be attached to the ladders using an attachment such as a bracket, sling or similar which has a suitable load rating using the ladder stile or stiles. This is described in the following items 1.9 to 1.13. (Example Method of Fall Arrest).

1.8 The third option consists of the use of twin or double lanyards to allow the operative on the ladder to ensure that he always has at least one point of connection to the ladder stiles by moving the lanyards one at a time as he changes position. This option is not a particularly efficient method of working and is perhaps only appropriate for use whilst installing one of the other two systems described above.

1.9 **Example Method of Fall Arrest during Ladder Installation and Demounting Operations with Rescue Option**

(See also diagram 33)

1.10 The provision of fall arrest systems during the installation and removal of steeplejack ladder sections generates a number of unusual problems. There are frequently two persons aloft during this process who are constantly moving up the ladder run as it is installed. The work front is constantly moving and access is generally not available to anchorage points above the immediate work area. Fall arrest anchors are generally set using resin rather than by mechanical expansion. Installing anchors at the work front each time it is relocated is generally not practical when resin curing times are taken in to account.

1.11 This example method has been prepared to illustrate a means of assuring 100% attachment to a fall arrest system for operatives aloft during the ladder installation and removal works. Companies intending to follow this methodology must ensure their staff have been adequately trained in the installation, use and removal of the equipment proposed. Ladder sections in use must have been tested to confirm that they will withstand the forces generated if the fall arrest system is activated. ATLAS have produced a paper describing drop test results in accordance with BS EN 795 carried out on some of the more common steeplejack ladder sections in use, when installed to a structure using the criteria within the Safe Use of Ladders for the Specialist Access Industry. Companies using ladder sections which are not featured in the ATLAS paper are advised to carry out and record their own drop tests on the particular ladder section, mirroring the intended installation system. Companies undertaking this work also have an option of developing a fall arrest system themselves for this process but are reminded they must be capable of demonstrating the effectiveness of the system to any visiting authorities.

1.12 Equipment required to set up a fully re-locatable fall arrest system is listed below;

a. 2 No. Anchors to BS EN 795 for each person intending to work aloft during the install/demount process
b. 1No. 10mm diameter dynamic rope to BS EN 892 with a length equivalent to twice the height of the structure for each person aloft
c. 1 x full body harness to BS EN 361 for each person aloft to be fitted with a minimum of two lanyards approximately 40cm to 45cm long, made up of dynamic rope to BS EN 892 and screw gate karabiners to BS EN 362
d. 1 x Self braking descender / belay device to EN 12841: 2006 and BS EN 341: 2011 for each person aloft
e. At least 10 No. 1t short sewn slings to BS EN 566 with karabiners to BS EN 362 for each person aloft

- **All of the above equipment should be in good order with documentary evidence available that it has been inspected prior to use**

1.13 Methodology for installation and relocation of the fall arrest and recovery system is itemised below;

1) Install 2 No. BS EN 795 fall arrest anchors at the base of the structure for each person aloft during the install/demount process, allow the resin to cure as necessary and then proof test to 6kN in accordance with BS 7883.
2) If two persons are going aloft to install/demount ladders then each pair of anchors should be set adjacent to the intended ladder run but on opposing sides for each operative
3) At least one ground based operative shall be available for each person aloft to assist with the operation of the fall arrest system.
4) Once the fall arrest anchors have been certified as ready for use, a belay device (as described under Item d above) for each person, shall be installed to one of their two

allocated anchor points and the dynamic rope shall be passed through the device. The “live” end of the rope shall be attached to the operatives body harness at one of the designated fall arrest attachment points (preferably the front, sternal attachment point) using a karabiner and bowline or scaffold knot whilst the remaining end is secured to the other anchor of their allocated pair.

5) The lead climber will set the base ladder out as described in the main body of the ATLAS Ladder Guide and secure it in the prescribed manner. He will utilise the 2 No. lanyards attached to his harness to maintain at least one close attachment to the ladder stiles at all times during this process, securing and relocating lanyards as necessary. **(The stile of the ladder is always the strongest component and lanyards should never be attached to a single rung.)** An assistant at ground level will ensure that enough slack rope is paid out through the belay device to allow him to climb when required and then the “dead” end of the rope is taken in and re-secured once he reaches his working position.
6) Once the first ladder section is secured the next ladder section will be passed to the lead climber from ground level and he will again secure it in the prescribed manner. During this process he will continue to utilise his double lanyards to assure at least one close attachment to the stiles at all times as he progressively secures and climbs the second ladder section.
7) Once at the top of the second ladder section the lead climber will install a short sewn sling around the ladder stile adjacent to the uppermost ladder fixing and he will set a karabiner through the eyes of the sling and place the dynamic rope into the karabiner to form a belay anchor. Once the assistant at ground level has taken in any slack, the belay system can be regarded as ready for use and the double lanyard system on the lead climbers harness can be dispensed with.
8) If a second person is going to assist with the ladder installation process he will set up the belay system as described under item 4 but to the opposite side of the ladder run.
9) The second climber will then ascend to the top of the first ladder, alternating his double lanyards on his harness as necessary to maintain close attachment to the stile to at least one location at all times while an assistant at ground level pays out slack on the dynamic rope through the belay device, locking off as described under item 5 once he reaches his work position. **The second climber must stay at least one ladder below the lead climber at all times.**
10) A third ladder section will be passed from ground level to the second climber who will, in turn, hand the ladder section to the lead climber.
11) The lead climber will secure the third ladder section and install additional short sewn slings and karabiners to the stile of the ladder to form belay anchors as he installs and climbs the ladder section whilst the assistant at ground level pays out just enough slack on the dynamic rope to facilitate this activity. It is recommended that belay anchors are installed adjacent to each point the ladder is secured to the structure.

*Note

12) Tests carried out at SATRA to determine the effectiveness of this type of restraint system were based upon allowing a mass of 100kg to fall a distance of 3.1m before being arrested by the belay system. Personnel adopting this restraint method must ensure that the prescribed guidance within the Atlas Ladder Guide for ladder fixing distance (max 1.55m) is followed.
    They must also ensure that the upper belay anchors are constantly relocated to be set adjacent to the ladder fixing closest to the operatives working position and that only the minimum amount of slack rope is released through the belay device at ground level to facilitate the operative reaching the next ladder fixing position. Compliance with all of these requirements will ensure that the test parameters and resulting system loads are never exceeded.

13) The second climber will then ascend the second ladder in the run, maintaining one ladder section spacing between himself and the lead climber, before setting up his own belay anchor using a sling and karabiner but to the opposite stile to the lead climber. The second climber will then also dispense with the double lanyard system.
14) Further ladder sections will be delivered to the work front using a heaving line for installation as required with the lead and second climbers progressively adding belay anchors and placing their dynamic ropes through the belay anchor karabiners as the work front advances.
15) The second climber may recover the lead climbers slings and karabiners as he reaches the ladder below the lead climbers position and hand them up to him for re-use with the next ladder section.
16) The second climber will periodically need to descend to recover some of his own slings and karabiners for re-use further up the structure and this will be achieved with the assistance of an operative at ground level who will pay out slack on the dynamic rope as he descends and take in the slack as he ascends back to the work position.
17) The above processes will be repeated until the intended height of ladder run has been achieved at which time the fall arrest system shall be replaced with a static safety line and rope grab device. (See section on **"Static Safety Line Installation" - Item No. 30**)
18) If either the lead or second climbers suffer a fall as a result of an unforeseen event, illness or injury then the belay device at ground level will lock off and arrest their fall within a short distance of their work position.
19) If either the lead or second climbers become incapacitated due to an event as described above, then they can be safely lowered to ground level in a controlled manner by an assistant at ground level using the belay device. (See note on rope length under paragraph 2 Item b)
20) Security of operatives during removal of the ladder sections can be achieved using the same system in reverse which must be set up prior to removal of any static safety line.
21) The dynamic safety lines for lead and second climber shall be set up through a belay device secured to anchors at ground level with a belay anchor installed to the top ladder section and the section below. Lines for lead and second climber shall be set at opposing sides of the ladder run.
22) The lead and second climbers shall take up position on the belays on the top and second from top ladders and assistants at ground level shall take in any excessive slack rope. (Note requirement for 1 ladder separation between lead and second climber)
23) The lead climber shall set his belay anchor at the second from top attachment point on the uppermost ladder and his assistant at ground level shall take in slack and lock off the dynamic rope at ground level.
24) The lead climber will then reach up and remove the uppermost attachment to the structure from the top ladder before relocating his belay anchor adjacent to the next ladder attachment point down.
25) The second climber will observe and monitor the lead climber, lowering his belay anchor position as required to maintain the minimum separation requirement.
26) As the lead climber removes ladder sections, he will hand then down to the second climber who will in turn attach them to a heaving line and lower them to ground level.
27) Assistants at ground level will constantly monitor the belay devices and immediately take in any slack generated as the climbers aloft descend.
28) Items 24 thru 27 will be repeated until the climbers enter the zone two ladders from the base of the structure at which time they will revert to using the double lanyards on their harness to maintain at least one close attachment to the ladder stile.
29) The fall arrest anchors at ground level may be retained for future use but should be clearly labelled with their intended duty and future test requirements.

1.14 Static Safety Line Installation

1) Once the intended ladder run is installed it is recommended to install a static safety line to provide a means of fall arrest without the need to have assistants at ground level, as for the belay system. There are many proprietary systems available in the market place but a simple example system is described below. As for the belay system, companies intending to follow this methodology must ensure their staff have been adequately trained in the installation and use of the equipment proposed. This example is based on the static safety line being suitable for one person only but multi-user systems are available.

1.15 Equipment required to set up a static fall arrest system is listed below;

a. 1No. Anchor to BS EN 795 for each person intending to be on the ladder run at any one time
b. 1No. 11mm diameter static rope to BS EN 1891 with a length equivalent to once the height of the structure for each person aloft
c. 1 No. full body harness to BS EN 361 for each person aloft to be fitted with a minimum of two lanyards made up of dynamic rope to BS EN 892 and screw gate karabiners to BS EN 362 and a rope grab device to BS EN 12841: 2006
d. 1 No. Anchor for each person aloft to be used to secure tail of fall arrest rope

1.16 Methodology for installation and use of static safety line

1. All installation works to be undertaken from belay system as described in preceding section
2. Install a single BS EN 795 fall arrest anchor for each person to be simultaneously aloft on ladders adjacent to the top of the ladder run, test and certify in accordance with BS 7883.
3. Install a static safety line for each person to be simultaneously aloft on ladders to the fall arrest anchors through a karabiner.
4. Install a tail retaining anchor at the base of the ladder run for each person to be aloft and secure the tail end of the static safety line through a karabiner inducing light tension in the line.
5. Personnel on the ladders may then connect to a static safety line (one line for each person) through the rope grab device on their harness and dispense with the belay system.
6. Removal of the static safety line system shall be in reverse sequence for erection with personnel aloft transferring from static safety line to belay system prior to removal of the static safety line.
7. The static safety line may be left in position for prolonged periods depending on the nature of the works to the structure and should be subject to periodic detailed inspections at suitable intervals which take in to consideration the environment in which the static safety line is used and the frequency of use.
8. If there is any doubt as to the integrity of the static safety line then inspecting technicians must carry out the inspection using the belay system.
9. Static safety line may be subject to chafe under wind load and it may be worthwhile to introduce lateral arrests to the ladder stiles to minimise the effects of this.
10. The fall arrest anchors at top level may be retained for future use but should be clearly labelled with their intended duty and future test requirements. Due regard should be given to adverse local conditions of the structure which may affect the anchors such as emissions. In these conditions, a decision to leave them in position needs to be made at an early stage.

11. The static safety line will provide adequate protection from falls during ascent or descent of the ladders but will not permit recovery of injured or incapacitated technicians.
12. A proprietary recovery system must be readily available on site or the necessary equipment to allow an experienced technician to rig for and execute a recovery under casualty conditions. The means of recovery from the static safety line system shall be included within the rescue plan for the project. Many safety equipment manufacturers produce manual rescue winches fitted with a fibre rope rather than a wire rope and these can be used to either raise or lower a casualty as preferred to heights of up to 200m. This type of equipment is light and portable enough to be stored in a standard rope bag making placement at the head of the ladder run for use in emergency a viable option. The rescue winch may then be used by rescuing technicians to attach and slightly raise any casualty arrested on the static safety line, before releasing him from the static safety line and then lowering or raising him to the recovery point. The rescue system must be rigged independently from the existing static safety line supporting the casualty.

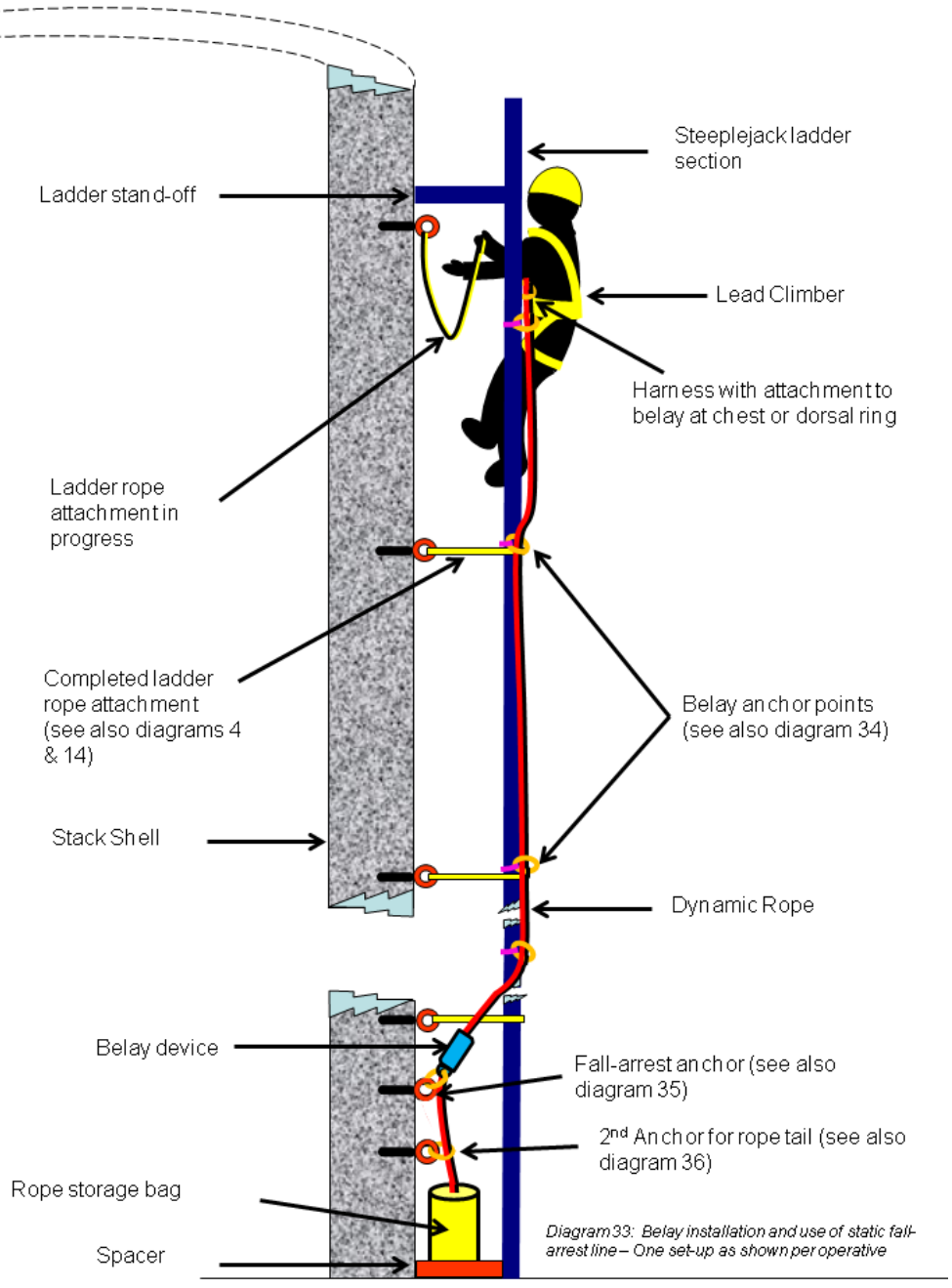


Diagram 33: Belay installation and use of static fall-arrest line – One set-up as shown per operative

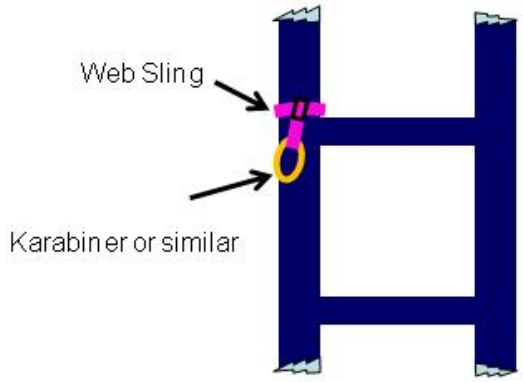


Diagram 34: Belay anchor point

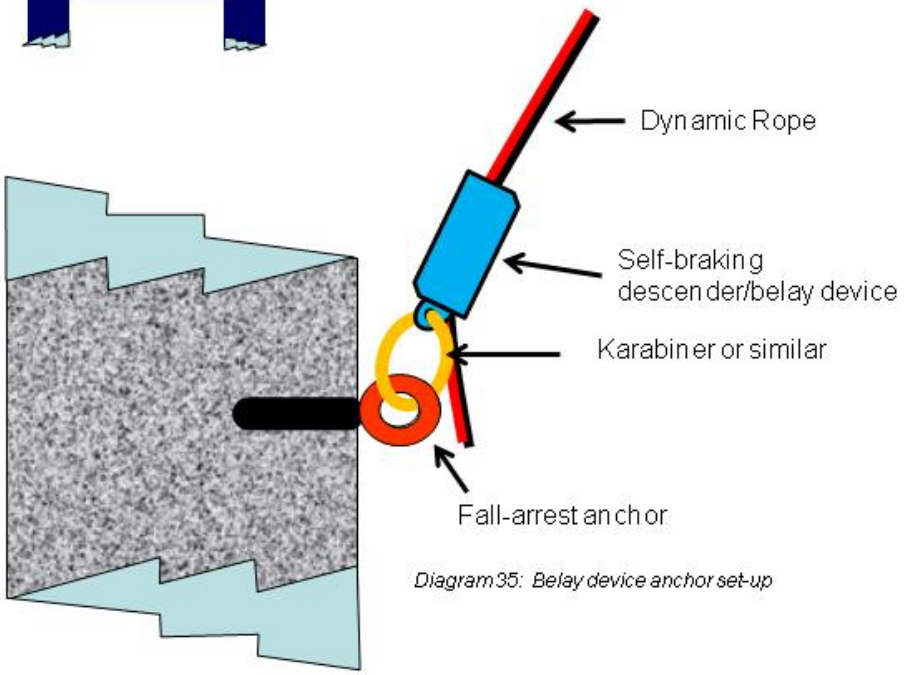


Diagram 35: Belay device anchor set-up

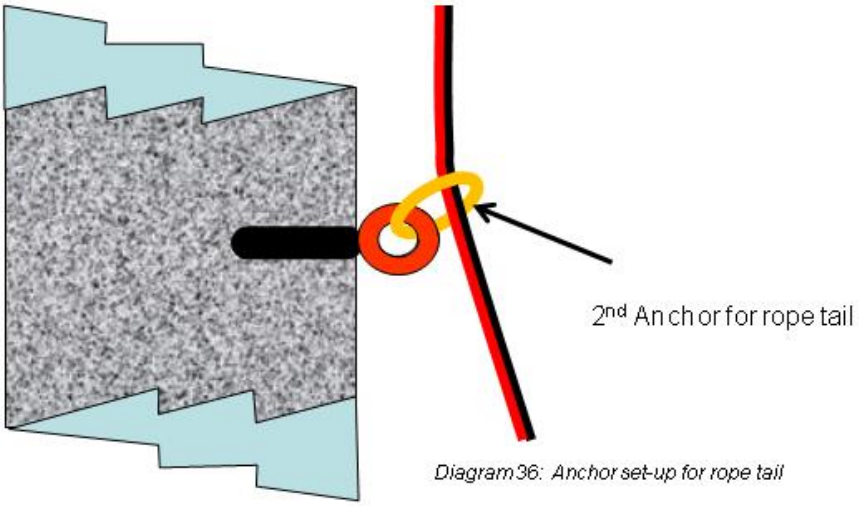


Diagram 36: Anchor set-up for rope tail

Personal Fall Protection – General

(This covers personal fall protection applicable to height work in general however the recommendations can also apply to fall protection for laddering)

1.17. Personal fall-protection systems are placed at the lower end of the work at height hierarchy. Avoidance and fall prevention by collective means (eg guard rails, MEWPs and scaffolds, etc) should be considered first and although specialist access work makes this difficult there are often other tasks on a project where these can be considered.

1.18. Where this cannot be considered the two most common types of personal fall-protection systems used in general work at height are work restraint and fall arrest. However the specialist access industry more often use rope access but as general personal fall protection can feature at some stage of a contract details are included in this guide. Work positioning techniques can also be used but tend to be on masts etc. where again rope access is considered the best option.

Selecting Precautions

1.19. When selecting the precautions to use to protect against falls from height you must follow the hierarchy of measures set out in page 13 of this guide.

Training and Supervision

1.20. A personal fall-protection system relies on the user's competence and discipline to make sure that the system is used consistently and effectively. Supervising and monitoring people under your control to ensure they are using personal fall protection equipment properly is as important as training them.

1.21. Personal fall-protection systems are not foolproof and their safe use is not always common sense. Without proper training in fitting, use, maintenance, installation and equipment limitations, all that a personal fall-protection system can provide is a false sense of security.

1.22. Adequate information, instruction, training and supervision shall be given when a personal fall-protection system is used, eg;

- how to select the correct products for the work situation;
- how to wear the harness and adjust it to the body:
- how to use and adjust the lanyard and other equipment;
- how to self rescue or assist others after a fall;
- how to inspect the equipment and recognise significant defects;
- how to assemble the system correctly; and
- how to recognise and attach safely to approved anchorage points.

General Considerations

1.23. All decisions regarding the use of fall protection equipment must be properly risk assessed and method statements compiled. Supervision and management controls should be employed during work.

1.24. There are a number of elements to a fall-protection system, typically an anchor point or anchor line, a connecting element such as an adjustable or fixed lanyard and a full body harness. Examples include: a single lanyard incorporating an energy absorbing element, a full body harness and an approved single anchor point;

- A horizontal anchor line with multiple anchors that can support a number of workers using full body harnesses and lanyards incorporating energy absorbing elements; a retractable-type fall arrester, a full body harness and an approved connector such as a sling, which could be tethered to structural steelwork that has been approved for attachment of the fall-arrest system.

1.25. Make sure that all of the elements are compatible with each other. You may need to check with manufacturers or suppliers as to the compatibility of the elements that make up your chosen system.

1.26. The size, weight and number of users must be taken into account when selecting the appropriate fall-protection system. Refer to the manufacturer's instructions for use for further guidance.

1.27. The elements that make up a fall-protection system should be tested and conform to the requirements of the relevant European standards and carry a CE mark, accompanied by the notified body's registration number.

1.28. The safe performance of a fall-protection system depends on connection to a suitable structural anchor. If a fall occurs and the structural anchor fails, then the fall-protection system will be of no benefit at all. The suitability of the anchor, and its supporting structure, to withstand the imposed loads and particularly any fall arrest loads without the risk of failure should be verified by calculation or by testing. For example, a guard rail forming part of an edge protection system will have enough structural strength to act as edge protection but it will be unlikely that it would have been designed to withstand the higher dynamic and static forces of fall arrest. Before it is used as an anchorage for a fall arrest lanyard and harness, its strength would need to be reassessed by a competent engineer.

1.29. When using horizontal anchor lines (sometimes referred to as running lines) as lifelines, it is important to limit the number of workers to that prescribed by the manufacturer, and to obtain performance calculations of end forces before use. This is because forces in horizontal anchor lines can be magnified many times at the anchor points in the event of a fall.

Inspecting Equipment and Anchors

1.30. All parts of a personal fall-protection system should be subject to an inspection regime that includes pre-use checks and periodic detailed inspections. It may also require additional interim inspections.

Pre-use Checks

1.31. Before each use, equipment should be visually inspected and checked by hand, in accordance with the manufacturer's instructions, by a competent person (preferably the user).
If any defects are found the equipment must not be used.

Detailed Inspection of Equipment

1.32. Periodic detailed inspections must be carried out by a competent person in accordance with current legislation and the manufacturer's instructions. The inspection should be recorded. The recommended minimum frequencies for such inspections are:

- because of its susceptibility to wear, damage and degradation, equipment made from webbing, rope or textiles should not be used unless it has been inspected in detail at least once in the preceding six months. Detailed guidance on inspecting equipment made from webbing or rope is given in ‘Inspecting fall arrest equipment made from webbing or rope’ INDG367
- other parts, including anchors/anchor systems, should not be used unless they have been inspected in detail at least once in the preceding 12 months.

Interim Inspections

1.33. Interim detailed inspections may be required in addition to pre-use checks and six- or 12-monthly detailed inspections. They will be required where the employer's risk assessment has identified a risk that could result in the system deteriorating significantly before the next planned inspection, eg exposure to grit blasting or paints or chemicals. The interim inspections should be recorded.

Post-fall Inspection

1.34. If a fall-protection system has had to arrest a fall, or has been subject to other high-shock loads, then none of the elements in that system must be used until they have either undergone a detailed inspection or been replaced in accordance with the manufacturer's instructions.

Work-restraint Systems

1.35. Work-restraint systems are sometimes referred to, inaccurately, as fall restraint. In a work-restraint system, the position of the anchor point(s), when combined with the user's PPE, allows a worker to carry out their job but prevents them from reaching any position from which they could fall. This type of system increases user safety and reduces the need for rescue provision. Where practicable a work-restraint system should be used in preference to fall arrest.

1.36. A working area will often have more than one edge or other place from which a worker could fall. For example, access to a chimney may require accessing a roof area which can have edges along the eaves and along the gables; it may also contain fragile roof lights. Make sure that the work-restraint system prevents the user from reaching any location from which they could fall.

Work restraint must <u>never</u> be used where a fall can take place as the equipment in the event of a fall is likely to fail causing injury/death to the user.

Fall-arrest Systems

1.37. Fall-arrest systems should incorporate some form of energy absorber or an energy-dissipating element. This must make sure that, in the event of a fall, the forces on the user do not exceed 6 kN and will help reduce the transfer of forces to the structure to which the system is attached.

1.38. For a fall-arrest system to function correctly there must be adequate clearance beneath the work area. To illustrate this, three examples are given in the table below.

Example of calculation of minimum free space requirements for a fall arrest system based on an energy absorbing lanyard		
Description	Measurement m	
	Anchor point at foot level	
	2 m Lanyard	1.5 m Lanyard
Length of lanyard + Length of extended energy absorber	2.0 + 1.75	1.5 + 1.25
Harness stretch distance + Distance between the connection point of the lanyard on the harness and the user's feet	2.0	2.0
Safety clearance	1.0	1.0
Minimum free space requirement	**6.75**	**5.75**

Example of calculation of minimum free space requirements for fall arrest systems based on a vertical anchor line		
Description	Measurement m	
	Rigid anchor line	Flexible anchor line
Free fall distance + Fall arrester operation distance + Length of extended energy absorber (if included in system) + Anchor line extension distance[a] + Harness extension distance	1.5	2.5
Safety clearance	1.0	1.0
Minimum free space requirement	**2.5**	**3.5**
[a] Applies only to the system with a flexible anchor line		

Example of calculation of minimum free space requirements for fall arrest systems based on a horizontal anchor line and an energy absorbing lanyard		
Description	Measurement m	
	Single span horizontal anchor line, 10 m span	Multi-span horizontal anchor line, 3 m span
Length of lanyard + Length of extended energy absorber + "V"-deflection of anchor line[a]	4.5	3.0
Harness stretch distance + Distance between the connection point of the lanyard on the harness and the user's feet	2.0	2.0
Safety clearance	1.0	1.0
Minimum free space requirement	**7.5**	**6.0**
[a] Applies only to the system with a flexible anchor line		

These calculations are examples for guidance only and should be assessed relative to the person and equipment being used and site conditions.
Refer also to BS 8437:2005+A1:2012 Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace.

1.39. If a fall-arrest system is in use then the employer must consider and plan for rescuing or retrieving a fallen worker. There should always be a rescue plan in place with the necessary equipment and trained people to carry out a rescue in safety without putting more workers at risk.

1.40. A fallen worker must be rescued as quickly as possible.

1.41. It is good practise to install fall-arrest system anchor points as high above the user as possible, as this reduces forces, risk of injury and, in the event of a fall, makes rescue easier. Anchors must not be installed below foot level.

1.42. If using retractable fall arresters (sometimes called 'inertia reels'), they should be anchored vertically above the user so that the extendable line between the reel and the user runs largely vertically. If you wish to use a retractable fall arrester in any other orientation you should get confirmation from the manufacturer that it has been tested and found safe for use in the desired orientation.

1.43. Where there is a risk that a worker will fall from an exposed or unguarded edge and the lanyard or extendable line from a retractable fall arrester will come into direct contact with the edge of the structure during the fall arrest, it is important that only equipment tested for this particular circumstance is used. You should seek confirmation from the manufacturer that the device is fit for the purpose you wish to use it for. Failure to follow this advice could lead to the catastrophic failure of the fall-protection system.

1.44. Several national and European standards apply to fall- protection systems and the individual elements such as lanyards, harnesses, anchors etc. The two British Standards listed below give general advice and list the other relevant standards:

- BS 7883:2005 Code *of Practice for the design, selection, installation, use and maintenance of anchor devices conforming to BS EN* 795;" and
- BS 8437:2005 *Code of practice for selection, use and maintenance of personal fall protection systems and equipment* for use in the *workplace.*

1.45. The Work at Height Safety Association website contains guidance notes on the use of fall protection equipment: www.wahsa.org.uk.

Rescue: A rescue procedure must be in place for all access systems. (See appendix 3)

Appendix 2 – Training and Competence for Access Specialist Workers

2.1 Work at height is potentially dangerous and those involved in work at height need appropriate knowledge, skills and experience to carry out specialist access work safely and competently. A competent access specialist will be one who has:

- has sufficient knowledge to undertake the task safely, and to recognize his limitations;
- understands any potential hazards related to carrying out the work and the use of the equipment; and
- can detect technical defects or omissions in that work (or equipment), recognize any implications for health and safety caused by those defects or omissions, and be able to take appropriate action to prevent harm.

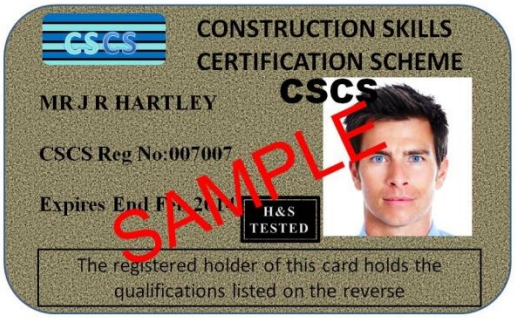
2.2 Trainees or less experienced height workers need to be under the supervision of a competent person.

2.3 If you control the work of persons operating at height, you shall have clear procedures that identify those tasks or work activities which require specific competences, and authorise only competent workers to carry them out.

2.4 Developing competence in health and safety is an ongoing process. Individuals will develop their competence through experience in the job and through training, which is part of 'lifelong learning'

2.5 Passing the basic Construction Skills Health and Safety Test, or an equivalent, provides evidence of a threshold of health and safety knowledge appropriate for a new starter in construction. Whether CSCS or equivalent, the correct category of card or certification should be held for the type of work to be carried out. Cards applicable to the work carried out in this guide include;

Steeplejack Industry Accreditation A
Steeplejack Assessed Route B
Steeplejack Brick/Concrete Structures
Steeplejack Church/Stone
Steeplejack Steel Structures
L.C. Engineer Industry Accreditation A
L.C. Engineer Assessed Route B



2.6 To achieve competence, workers should be trained in safe working practices and those health and safety issues specific to their trade. It is not enough to hope that they will 'pick up' safety on the job from other workers - they might simply be learning someone else's bad habits. Employers need to be sure of their employee's abilities before setting them to work and must provide training where it is required. Access specialists will need training on the risks they will encounter (such as understanding fall protection) and safe systems of work to control them.

2.7 British Standard BS 8454:2006 provides guidance and recommendations on the delivery of training and education for work at height, including rescue.

2.8 Training provided for access specialist workers should make sure that trainees gain an awareness of the following elements of health and safety knowledge:

- main provisions of the Work at Height Regulations 2005 (As amended);
- the work at height hierarchy;
- interpreting risk assessments and method statements:
- fragile surfaces;
- edge protection;
- access and egress, eg cradles, hoists and ladders;
- rope access
- manual handling:
- selection and type of work equipment, e.g. hoists.
- workplace inspections
- scaffold awareness
- harness training and inspection
- rescue training
- plant i.e. MEWPS
- environment, i.e. weather conditions
- fitness to work and tools and equipment
- work on brick, steel, stone and concrete structures

2.9 Further specialist training will be required for specific types of specialist access work or for tasks such as tower scaffold erection, operating a MEWP, emergency rescue, abrasive wheels etc.

2.10 Other workers also have to access the work area, eg safety advisors, engineers, designers, quantity surveyors, maintenance staff and plant installers to name but a few. They will also need training in working at height (that reflects the activities they are expected to carry out) before they can be deemed competent to visit or work at height.

2.11 Managers and supervisors need to be competent to deliver safety standards on site. To achieve this they will need health and safety training to:

- assess and prioritise the risks on a particular project;
- design safe systems of work that are appropriate to specific site conditions; and
- prepare clear, simple safety method statements that can be used and understood by site operatives and others.

2.12 Supervisors should be able to interpret a method statement, follow the safe system of work set out in the method statement and explain the method statement to others.

Appendix 3 – Rescue

3.1 A rescue plan needs to be in place for all work at height including the use of ladders in the specialist access industry.

3.2 The Work at Height Regulations require employers to make specific provisions for emergency planning and every employer shall ensure that work at height is properly planned and includes planning for emergencies and rescue.

3.3 In addition, the regulations require that all activities, including rescue, must be carried out by competent persons.

3.4 Due to the different techniques involved in the use of laddering in the specialist access industry there is no 'one size fits all' rescue procedure however, the following should be considered at all times:

3.5 A specific rescue plan and adequate resources should be in place for each worksite where work at height is carried out. These should be regularly assessed and updated where necessary. Resources should include not only equipment but also personnel who have been trained in the use of that equipment.

3.6 When planning for rescue whilst using specialist access ladders, consideration should be given as to whether the ladder system can be incorporated into the rescue procedure or whether separate or additional anchor points need to be incorporated.

3.7 For additional guidance refer also to The Work at Height Safety Association Technical Guidance Note 5 "Guidance on rescue during work at height" and; BS 8454:2006 Code of practice for the delivery of training and education for work at height and rescue. Refer particularly to 12.3.7 Workmate rescue and A.3.5 Lifting equipment used for lifting people.

Appendix 4 – Terminology

No.	Term	Definition
1.	Access specialist/ steeplejack ladder	Ladder used in the height industry to gain vertical access to the top of a structure such as a chimney or spire. Ladders are usually slotted together vertically end to end and linked to the structure by anchors and fixings.
2.	Anchor	Means to connect temporary ladder to structure being laddered for access.
3.	Anchor fixing	Anchors normally fixed into a structure to connect the temporary ladders. The fixings can consist of drilled-in sockets to house an anchor ring bolt or similar. Anchor bolts can also be fixed without the need for sockets. Full details are available in a separate guide.
4.	Arm	See 'Stand-off'.
5.	Combination ladder	Rung ladder of several parts that can be used as single ladder, extending ladder, standing ladder or as standing ladder with an extending ladder at the top. These should not be used at an angle of 90°.
6.	Cross-Trees	Normally located on the inside of a spire connected from the spire to the finial rod at an intermediary point or the base to secure the finial to the spire.
7.	Extending ladder	Leaning rung ladder consisting of 2 or 3 parts and having stiles which are arranged parallel to one another in each part of the ladder. The length may be regulated by one rung at a time. These should not be used vertically.
8.	Fall arrest	Using this technique, a fall is allowed to take place. The fall arrest system then reacts by arresting the fall in a controlled manner.
9.	Foot spacer	See spacer.
10.	Groundsman/ person	An operative located at ground level to assist access specialists during installation and removal.
11.	Harness	Usually made from webbing and worn by operatives to enable connection to a lanyard and an anchor which can prevent or restrain an operative from falling.
12.	Hauling	Transferring ladders to and from height using rope and pulleys or similar.
13.	Horizontal safety line	A rope or wire which an operative can securely connect to which prevents or restrains an operative from falling whilst traversing horizontally.
14.	Inner width	The usable distance between the inner sides of the stiles.
15.	Iron	See 'Stand-off'.
16.	Karabiner	A fastening device which can attach equipment such as lanyards and safety lines etc. to each other but can be securely closed.
17.	Ladder	Device incorporating steps or rungs on which a person may step to ascend or descend.
18.	Ladder splice	Where two specialist access type ladders cannot be connected in the usual fashion, such as sockets, and are joined together usually by rope lashings.
19.	Lancashire ladder	A traditional type of ladder used in the specialist access industry usually connected vertically by hoops on the end of the stiles
20.	Lanyard	Device connecting a harness to an anchor. In the case of fall arrest, the lanyard will have a shock absorbing device or properties. In the case of work restraint a shock absorber is unlikely to be present.
21.	Lashing	A rope or similar which connects a temporary ladder to an anchor system. The rope is normally made from polypropylene. However on structures where the lashing may be affected by heat or substances it can be made from steel or similar. May also be used from one side of a ladder (stile), completely around a structure and connected to the opposite ladder stile.
22.	One-piece leaning rung ladder	Leaning run ladder consisting of one part only.

23.	Outside width	Distance between the outer side of stiles measured at the lower end of stiles.
24.	Oversail	A feature of a structure being laddered which projects out to obstruct the vertical path of the ladder track.
25.	Portable ladder	Ladder which can be transported and set up by hand, without mechanical aid.
26.	Push-up extending ladder	Extending ladder where the upper parts are extended by hand. These should not be used vertically.
27.	Reasonably practicable	This means that you have to take action to control the health and safety risks in your workplace except where the cost (in terms of time and effort as well as money) of doing so is 'grossly disproportionate' to the reduction in the risk.
28.	Ring bolt	A type of anchor bolt (among others) used for laddering. There are commonly two types of different sizes. One can normally be used for ladders only and the other type can be used for ladders and scaffold tubes. The fixings guide available from ATLAS should be used to ensure the correct type is used.
29.	Roof ladder	A single or extending ladder which is normally used on sloping roofs. The ladder is normally secured in place by means of a hooped bracket located over the ridge of the roof.
30.	Rope access	An access system using two ropes, a working rope and a safety rope, each secured to a reliable anchor. The user's harness is attached to both ropes in such a way they can get to and from the work area and the risk of falling is prevented or limited.
31.	Rope-operated extending ladder	Extending ladder where the upper parts are extended by means of a rope. These should not be used vertically.
32.	Rung	Climbing support with a walking surface of a width from front to back of less than 80mm and more than 20mm.
33.	Sectional ladder	Leaning rung ladder consisting of several sections that can be fitted together by means of connection devices. The length can only be varied by one whole section at a time. These should not be used vertically.
34.	Skid	See 'Stand-off'.
35.	Spacer	A piece of wood or similar (often a shortened scaffold board) which is positioned at the base of the bottom ladder between the stiles and the structure being accessed to maintain a fixed distance between the two to prevent the operatives feet from hitting the structure. The spacer should be used where the ladder has no lower stand-off or arms.
36.	Stand-off (Also known as arm, skid or iron)	A device which is fixed to the stiles of the temporary ladder and butts against the structure being accessed to maintain a fixed distance between the two to prevent the operative's feet from hitting the structure.
37.	Standing step ladder	Two-legged self supporting step ladder, unilaterally or bilaterally ascendable, with or without platform; a platform is regarded as a step
38.	Step ladder	Portable ladder with steps horizontal during use and a walking surface of a width from front to back equal to or greater than 80mm
39.	Stile	Lateral part of a ladder which supports the rungs or steps as well as cross struts of supporting legs.
40.	Total length	Distance measured over the bottom foot to the top of the top end cap of a ladder.
41.	Vertical safety line	A rope or wire which an operative can securely connect to which prevents or restrains an operative from falling whilst traversing vertically.
42.	Work platform	Work platform used as a place of work or as a means of access to or egress from a place of work such as gangway, gantry and stairway. A working platform is virtually any surface from where work is carried out.
43.	Work positioning	enable the user to work in tension or suspension to prevent or limit a fall, eg a linesman. A back-up system is needed in case the main support fails.
44.	Work restraint	This technique operates on the principal that the operative's movement is restricted to prevent them from reaching a fall situation, ie, open edge.
45.	Yorkshire ladder	A traditional type of ladder used in the specialist access industry usually connected vertically by sockets on the end of the stiles

Appendix 5 – Related Documents and Guides

5.1 There are a variety of documents and guides relating to the type of work covered in this guide, which may be of use to persons or organisations who have an interest in the height industry. These are:

5.2 Work at Height

- The Work at Height Regulations 2005 (as amended)
- A brief guide - The Work at Height Regulations 2005 (as amended) INDG401
- Inspecting fall arrest equipment INDG367
- Preventing Falls in Scaffolding and Falsework SG4:10 NASC
- Health and safety in roof work - HSG33
- Advisory Committee for Roofwork (ACR) publication ACR[CP]002; 2012 ‘Safe working on fragile roofs and roofs with fragile elements’
- Construction and Fixings Association/ATLAS Guidance Note: Anchors for Steeplejacking
- NASC/CFA guidance TG4: 11, Anchorage systems for scaffolds.
- BS 7985:2009 Code of practice for the use of rope access methods for industrial purposes
- BS 8454:2006 provides guidance and recommendations on the delivery of training and education for work at height, including rescue
- The Work at Height Safety Association Technical Guidance Note 5 “Guidance on rescue during work at height”
- Annexes 0 to 3 of the Guidance Note on Anchors for Steeplejacking
- ATLAS report on ladder fall arrest drop tests

5.3 Ladders

- BS 4211:1994 Specification for Ladders for permanent access to chimneys, other high structures, silos and bins
- BS EN 131-1:2007 Ladders
- BS 2037:1994 Specification for portable aluminium ladders, steps, trestles and lightweight stagings
- BS EN 131-1:2007+A1:2011 Ladders. Terms, types, functional sizes
- Safe use of ladders and stepladders INDG402
- SATRA Technical Report: Limited Testing of Different Ladders Using the Test Methods Given in EN 795: 2012 (SPC0219789/1346 Issue 2)

5.4 Equipment

- BS EN 10264-1:2012 Steel wire and wire products. Steel wire for ropes. General requirements
- BS 8437:2005+A1:2012 Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace
- BS 7883:2005 Code of Practice for the design, selection, installation, use and maintenance of anchor devices conforming to BS EN 795
- BS EN 1891:1998 Personal protective equipment for the prevention of falls from a height. Low stretch kernmantel ropes
- BS EN ISO 1346:2004 Fibre Ropes. Polypropylene split film, monofilament and multifilament (PP2) and polypropylene high-tenacity multifilament (PP3). 3-, 4-, 8- and 12-strand ropes
- BS EN 12841:2006 Personal fall protection equipment. Rope access systems. Rope adjustment devices
- BS EN 341:2011 Personal fall protection equipment. Descender devices for rescue
- BS EN ISO 1140:2012 Fibre ropes. Polyamide. 3-, 4-, 8- and 12-strand ropes
- BS EN 795:2012 Personal fall protection equipment. Anchor devices
- BS EN 892:2012 Mountaineering equipment. Dynamic mountaineering ropes. Safety requirements and test methods
- BS EN 566:2006 Mountaineering equipment. Slings. Safety requirements and test methods
- BS EN 362:2004 Personal protective equipment against falls from a height. Connectors
- BS EN 361:1993 Personal protective equipment against falls from a height. Full body harnesses

5.5 Construction

- Health and safety in construction. HSG150
- Managing health and safety in construction (ACOP) L144
  Construction (Design and Management) Regulations 2007

5.6 Chimneys

- BS 4076:19 Specification for Steel chimneys
- ATLAS Guide to the Inspection of Single Flue Steel Chimneys**.**
- Atlas Guide to the Inspection and Maintenance of Reinforced Concrete Chimneys and Natural Draught Cooling Towers
- BS EN 1993-3-2:2006 Eurocode 3 — Design of steel structures — Part 3-2: Towers, masts and chimneys — Chimneys
- BS EN 13084-1:2000 Free-standing industrial chimneys Part 1: General requirements
- BS EN 13084-2:2001 Free-standing chimneys —Part 2: Concrete chimneys
- CICIND (Comité International des Cheminées Industrielles - International Committee for Industrial Chimneys) Model Codes and Manuals are an excellent source of reference in relation to industrial chimneys (www.cicind.org)

5.7 General

- Manual Handling Operations Regulations 1992, (as amended)

Association of Technical Lightning & Access Specialists (ATLAS)
AIMS Administration Centre
7 Newton Place
Glasgow
G3 7PR
Tel: 0330 999 0026