Further reading

Using petrol-driven chainsaws	AFAG301
Top-handled chainsaws	AFAG308
Aerial tree rescue	AFAG402
Mobile elevating work platforms (MEWPS) for tree work	AFAG403
Emergency planning	AFAG802
Electricity at work: Forestry and arboriculture	AFAG804
Training and certification	AFAG805
First aid at work: Your questions answered	INDG214
Using work equipment safely	INDG229
Protect your hearing or lose it!	INDG363
The Work at Height Regulations 2005: A brief guide	INDG401
Safe use of ladders and stepladders: An employers' guide	INDG402
A toolbox talk on leaning ladder and stepladder safety	INDG403
Tips for ladder and stepladder safety	INDG405
Thorough examination of lifting equipment: A simple guide for employers	INDG422
LOLER: How the Regulations apply to arboriculture	AIS30

These publications are available from HSE Books - see 'Further information'.

A guide to good climbing practice is available from the Arboricultural Association, Ampfield House, Ampfield, Romsey, Hants SO51 9PA
Website: www.trees.org.uk

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Further information

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA
Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk
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For information about health and safety ring HSE's Infoline
Tel: 0845 345 0055 Fax: 0845 408 9566 Textphone: 0845 408 9577
e-mail: hse.infoline@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

This leaflet is available in priced packs of 15 from HSE Books, ISBN 978 0 7176 6342 2. Single free copies are also available from HSE Books.

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401

Tree-climbing operations

Arboriculture and Forestry Advisory Group

Introduction

This leaflet includes advice for climbers on safe working practices for tree-climbing operations, climbing procedures and how to use some common climbing aids. It also includes advice on the responsibilities of ground staff.

Tree-climbing work is subject to the requirements of the Work at Height Regulations 2005 and the guidance in this leaflet is applicable where a risk assessment has determined that climbing is the appropriate access method to undertake the work.

This leaflet should be read in conjunction with AFAG leaflets 301 *Using petrol-driven chainsaws*, 308 *Top-handled chainsaws* and 402 *Aerial tree rescue*.

You can use this leaflet, along with the equipment manufacturer's guidance, as part of the risk-assessment process to help identify the controls to put in place when carrying out tree-climbing operations.

Chainsaw users and others should be particularly aware of the potential hazards of being cut by the saw, hit by falling timber or passing vehicles and exposure to noise, vibration or electricity.

Remember:

- **All work at height must be properly planned, organised and supervised.**
- **Any equipment used must be suitable for the task and inspected before use.**
- **Everyone engaged in tree-climbing operations must be competent and have had appropriate training in all the tasks required (see AFAG leaflet 805 *Training and certification*).**

General

❑ **1** Carry out a risk assessment for the site as a whole, including an emergency plan, and record the significant findings. Make sure all the people involved in any operation on the worksite are aware of the controls identified and comply with them.

❑ **2** **A minimum of two people must be present during all tree-climbing operations. One of the team must be available on the ground, competent and equipped to perform an aerial rescue without delay** (see AFAG leaflet 402 *Aerial tree rescue*).

❑ **3** A competent and responsible person should know the daily work programme and agree a suitable emergency procedure with personnel on site.

❑ **4** All people involved with site works should be able to communicate with each other. Where the responsible person is not on site, communication should be possible, eg via mobile phone.

❑ **5** All site personnel should contribute to job planning, raise points of concern and stop work if something is unclear or a safety issue arises.

❑ **6** In some work environments, eg noisy and/or scattered sites, special measures may be necessary to ensure good quality communication, eg two-way radios.

❑ **7** In case of emergency, be able to provide the emergency services with adequate information, eg a grid reference, a designated meeting point, the distance from the main road, the type of access (suitable for car/four-wheel drive/emergency service vehicles). In urban areas, street names and postal codes are essential. Know the location details before they are needed in an emergency (see AFAG leaflet 802 *Emergency planning*).

❑ **8** On all reasonably foreseeable approaches to the worksite, erect warning and prohibition signs conforming to the Health and Safety (Safety Signs and Signals) Regulations 1996, indicating a hazardous worksite and that unauthorised access is prohibited. In areas of high public access, a risk assessment may indicate that additional controls, eg barrier tape, barriers or extra personnel, are required.

❑ **9** Climbers not specifically trained in utility work must observe the appropriate minimum distances for work adjacent to overhead power lines. Work may only proceed under the authority and guidance of the appropriate electricity company (see AFAG leaflet 804 *Electricity at work: Forestry and arboriculture*).

❑ **10** Everyone engaged in tree-climbing operations must be fit to undertake the task. Problems that could affect performance must be reported to management.

❑ **11** Climbers should be familiar with a range of techniques to improve their efficiency and reduce the risk of muscular and skeletal strain. Take into account physical constraints when selecting work techniques.

❑ **12** Climbing is physically demanding. Climbers should warm up and stretch before starting work. Where possible, share the climbing duties between two or more climbers.

❑ **13** Allow enough breaks during the work to minimise the risk of impaired judgement. In certain conditions, eg hot weather, it may be necessary to change the work method, climbing techniques or introduce further breaks to avoid physiological stress.

❑ **14** Climbers must be aware of the different characteristics of tree species and how these affect the work to be carried out. They must also be able to assess the structure and condition of the tree to be climbed and any potential weakness caused by decay and damage.

Personal protective equipment (PPE)

❑ **15** **While no PPE can provide 100% protection against cuts from chainsaws**, when climbing, chainsaw users should wear the following:

- A safety helmet (HSE strongly recommends a mountaineering style helmet complying with BS EN 12492).
- Eye protection (complying with either BS EN 1731 or BS EN 166).
- Hearing protection (complying with BS EN 352).
- Suitable gloves appropriate to the task and subject to the operator's risk assessment.

- Leg protection* and groin protection (complying with BS EN 381-5). HSE strongly recommends Type C leg protection for aerial work, because of the high all-round chainsaw cut protection. However, where wearing Type C is impractical (eg because of the higher risk of heat stress associated with it), it may be appropriate to use Type A, where justified by risk assessment.
- Protective boots* with good grip and protective guarding at front vamp and instep (complying with BS EN ISO 20345).
- Non-snag outer clothing. The use of high-visibility clothing may also be appropriate.

❑ **16** Climbers not using a chainsaw should wear the following:

- A safety helmet (HSE strongly recommends a mountaineering style helmet complying with BS EN 12492).
- Protective boots* with good grip and ankle support (complying with BS EN ISO 20345).
- Non-snag outer clothing. The use of high-visibility clothing may also be appropriate.
- Suitable gloves, appropriate to the task and subject to the operator's risk assessment.

❑ **17** As a minimum, climbers should carry a personal first-aid kit, incorporating a large wound dressing, barrier gloves, plasters and a whistle.

❑ **18** Climbers may carry a knife with either a lockable folding blade or a fixed blade held in a protective sheath.

❑ **19** Hand-cleaning materials such as waterless skin cleanser or soap, water and paper towels should be readily available.

Equipment

❑ **20** All new climbing equipment should be sold with evidence of conformity with the relevant BS EN standard, and carry a relevant CE mark. No structural alterations should be made to any item.

❑ **21** All items of fall-protection equipment must be used according to the manufacturer's instructions. Climbing equipment must only be used for its intended purpose.

❑ **22** Personal fall-protection systems should be put together by a competent person to ensure that each component and the system is appropriate for the service conditions and is correctly configured and compatible with neighbouring components.

❑ **23** Manufacturer's guidance should be followed when determining the typical lifespan of equipment. If the user is at any point unsure about a component, it should be removed from service and inspected by a competent person.

Work-positioning system

❑ **24** A work-positioning sit harness for tree climbing must have a pelvic attachment point and leg loop straps (to BS EN 813 and BS EN 358). Some models are also fitted with shoulder straps.

* The items marked with an asterisk should bear the chainsaw logo (see AFAG leaflet 301)

❑ **25** Work-positioning equipment supports the climber when working in the tree. It is designed to be used only in situations when the fall-protection system is under tension or any potential fall is limited to a short distance.

❑ **26** When using work-positioning techniques, do not climb more than 250 mm above your anchor point. Keep the climbing rope taut. Any slack must not exceed 500 mm.

Adjustable lanyards

❑ **27** Climbers should carry an adjustable lanyard, to provide (when appropriate) a secondary anchor to prevent the risk of pendulum swing. Lanyards are a key part of a tree-climbing system and have many uses, particularly as a supplementary load-bearing anchor point when working in the crown or when changing anchor points.

❑ **28** Lanyards should be adjustable to provide sufficient support to the climber.

❑ **29** The side attachment points on a harness are designed for support (for example, where the feet are on a branch or other part of the tree) but not suspension. Some harnesses provide forward attachment points suitable for suspension. It is important to consult the manufacturer's instructions for the harness.

❑ **30** The lanyard must not be attached to one side alone.

Fall-arrest systems

❑ **31** A fall-arrest system comprises an anchor point, a full-body harness, and a method of connection between the anchor point and the harness which incorporates a deceleration device (energy absorber).

❑ **32** Fall-arrest equipment is not commonly used in aerial tree work but may be appropriate, eg in unusual circumstances if climbers have to work above their anchor point. The extension of an energy absorber and the dangers of striking parts of the tree in a fall as well as the difficulties of achieving ergonomically acceptable work positions must be considered as part of the risk assessment.

Climbing ropes

❑ **33** Select ropes to provide a high margin of safety. Ropes suitable for tree climbing must have a minimum diameter of 10 mm and are not normally larger than 14 mm. When selecting a rope, carefully consider the compatibility of any friction hitches or mechanical devices used.

Friction hitches

❑ **34** Ensure that rope or cord used for friction hitches is of a suitable type and has a minimum diameter of 8 mm. Consider the fibre type and cord diameter, as this will have a significant impact on heat, abrasion resistance, knot-tying characteristics and working life.

❑ **35** Climbers must ensure that the friction cord selected is compatible with the climbing line. A diameter of 10 mm is recommended for normal commercial use.

❑ **36** Friction hitch materials are subject to high levels of wear. They should be inspected regularly, wear rates compared to manufacturer's guidelines and replaced where significant wear is found.

❑ **37** **Inspect climbing hitches thoroughly before, after and, if necessary, during each use.**

❑ **38** Climbers must be aware of the characteristics of each friction hitch they use and how they perform in combination with other components, eg a micro pulley.

❑ **39** The climbing system used must brake reliably and support the climber.

Knots and splices

❑ **40** Climbers must know the characteristics and scope of application of any knot used.

❑ **41** Tie, dress and correctly set each knot and monitor carefully during use.

❑ **42** Splices should be made by someone competent to splice, eg the manufacturer. Competence should be demonstrable for each rope type.

Karabiners

❑ **43** Each karabiner used to connect the harness to a lifeline should have a spring-loaded self-locking gate that requires at least three distinct movements to open it.

❑ **44** There are a wide range of connectors which function using this type of mechanism. It is vital that the most appropriate type is used for each specific application.

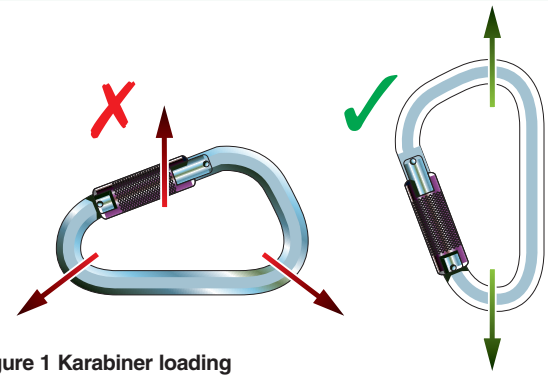

Figure 1 Karabiner loading

❑ **45** Ensure karabiners are loaded correctly. It is essential that they are kept in correct alignment. Secure climbing line and friction cord to the karabiner so that it is unlikely to misalign or come into contact with the gate mechanism. Use an appropriate rope termination and/or a rope-holding accessory such as a plastic fast or rubber sleeve.

❑ **46** Karabiners should not be 'chain linked' as this can easily lead to twisting and associated pressure on the gate.

❑ **47** Inspect karabiners carefully and maintain before and after use.

❑ **48** Monitor karabiners during use. The gate mechanism is susceptible to dirt build-up that can affect its function.

❑ **49** Clean the mechanism using soapy water followed by flushing with compressed air after drying. Lubrication may also be necessary (see manufacturer's recommendations).

❑ **50** Check the mechanism function by opening the gate 10 mm and applying light rotational pressure to the barrel to bias the mechanism towards the karabiner nose. Carefully rest the gate onto the karabiner nose and release. The gate should return automatically to the locking position.

NB The gate must function correctly and reliably before use.

Ladders

❑ **51** Check ladders for defects before use (refer to the manufacturer's instructions). See 'Further reading' for more advice.

❑ **52** Ladders are normally only used as a means of access into the crown of the tree. Once the climber is secured to the tree by rope/lanyard and harness, the ladder should be removed.

❑ **53** Position the base of the ladder at a distance approximately one-quarter the height of the ladder, away from a vertical line dropped from the point of contact with the tree. The unsupported part of the ladder must not touch any obstructions, even when loaded with the climber's weight.

❑ **54** The ladder should incorporate a non-slip or stabilising base and must be secured appropriately, either by a rope being attached from the tree to the ladder base or by being footed by a member of the ground staff.

❑ **55** Where possible, pre-install a climbing line to safeguard the ladder ascent. If this is not possible, the climber must be secured to the tree before leaving the top of the ladder, or carrying out any other work.

Using climbing irons

❑ **56** When using climbing irons, the climber should be secured to the tree with a climbing rope and/or a lanyard. Climbers using a chainsaw on an upright stem to which their primary anchor is attached should use a steel core adjustable flip line positioned above their climbing line.

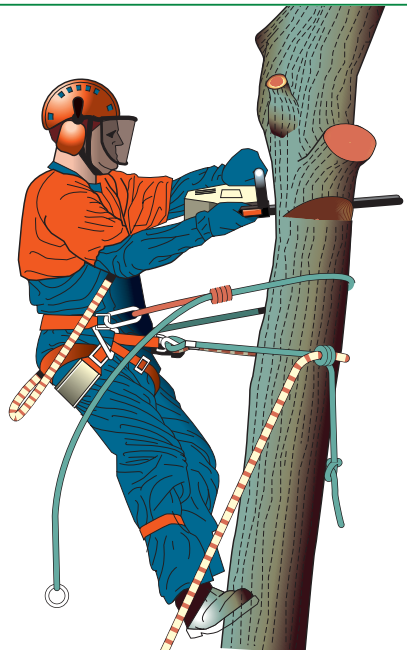

Figure 2 Section felling using spikes

- ❑ **57** Only connect the climbing line and/or adjustable lanyard/flip line to approved climbing attachment points on the harness. If attached centrally, ensure that the karabiner/s are not subjected to inappropriate loading. When using the lanyard from the side D-rings, take care to avoid the karabiner gates contacting objects and 'rolling' open.

- ❑ **58** Check that the climbing line and the steel core adjustable flip line are not at risk of being cut by the chainsaw.

Pre-use inspection

- ❑ **59** Climbers should check all equipment for excessive wear, damage or defects before use.

- ❑ **60** Interim inspections of equipment subject to high levels of wear and tear should be recorded, and climbing equipment should be 'thoroughly examined' by a 'competent person' every six months (see 'Further reading' for more information).

- ❑ **61** Withdraw defective equipment from use and destroy it, or mark it in such a way that it cannot be used by mistake.

- ❑ **62** Keep safety equipment and protective clothing clear of cutting tools, fuel, chemicals and any other potential hazards at all times while on site, and during storage or transit to avoid damage through contamination.

Anchor points

- ❑ **63** Assess the tree as a whole to ensure the structure is safe to climb. Climbers should be trained in how to select safe anchor points.

- ❑ **64** The choice of anchor involves assessing its strength and suitability in relation to its intended purpose. When a climbing system has been installed from the ground, test the anchor point using the weight of at least two people. It may be necessary to use binoculars to assess high anchors in some situations.

- ❑ **65** A main anchor in the tree must be strong enough to withstand both the lateral (ie sideways) force and downward loading encountered during climbing operations and in the event of a fall or pendulum swing.

- ❑ **66** If in doubt about the strength or suitability of a branch to be used as an anchor, it may be appropriate to pass the climbing rope, adjustable lanyard, or false anchor around the main stem, above the anchor branch.

- ❑ **67** When working in the top of the tree, it may be necessary to carry out work above the main anchor point. Supplementary anchor point(s) can be attached above the main anchor to give temporary support for work in a small area of the crown. In this situation, ensure that the supplementary anchor(s) is adequate and subjected to minimal lateral loading.

- ❑ **68** Use supplementary anchors, unless the risk assessment identifies the need for the climber to be able to move freely, for example, where there is a risk of a cut section striking the climber.

Ascent

- ❑ **69** When using rope advance techniques, ie ascending by climbing from one branch to the next while advancing fall-protection systems, the climber must be securely attached to at least one suitable anchor point at all times by means of a climbing rope and/or safety strop(s) and harness.

- ❑ **70** When changing anchor points, climbers should transfer their weight to the newly established rope system before releasing the original system. Climbers must ensure that before releasing the previous system, the new system and anchor has been thoroughly checked and tested.

- ❑ **71** Where possible, ensure that access lines are configured so that, if required, a climber could be lowered to the ground.

Movement within the tree

- ❑ **72** Climbers must be securely attached to the tree. The work-positioning system must be kept as taut as possible. Climbers should check their position in relation to the anchor point and ensure that a climbing line is not snagged on a weak shoot or dead branch which may give way.

- ❑ **73** Avoid the potential for a pendulum swing by the appropriate installation of redirects, supplementary anchors and the repositioning and/or sharing of anchor points.

Working with tools in the tree

- ❑ **74** Ground staff should transfer equipment to the climber using the climbing line or a separate tool line. Equipment should be attached so it does not damage the rope.
- ❑ **75** In many instances, tree-pruning work can be safely and efficiently carried out using hand saws, eliminating chainsaw hazards, eg noise, vibration, fumes and difficulties with communication. However, as risks of cut injury can be high, particularly to the hand holding the material being cut, consider wearing protective gloves.
- ❑ **76** Chainsaws must be checked, started, warmed up and turned off by a member of the ground staff before being passed up to the climber.
- ❑ **77** Use chainsaws of an appropriate size and configuration for the material being cut in the tree. The chainsaw must be started and operated in the tree in an approved manner (see AFAG leaflets 301 *Using petrol-driven chainsaws* and 308 T*op-handled chainsaws*).
- ❑ **78** Where the operation dictates that a larger rear-handled chainsaw is required, the method of use should be carefully considered, eg the starting and work position, and control of the saw.
- ❑ **79** When removing sections from the tree, climbers should check their work position in relation to the anchor point.
- ❑ **80** Ensure that climbing lines are not snagged on a weak shoot or dead branch which may give way. Climbing lines should be kept clear from falling debris.
- ❑ **81** Climbers and ground staff should be aware of risks from falling debris or equipment.

Descent

- ❑ **82** Before descent, climbers must check that the climbing system is of a suitable length to complete the planned descent.
- ❑ **83** Terminate the climbing system in such a way that it is not possible for the adjuster to run off the end of the rope, eg using a stopper knot or bulky stitched termination.
- ❑ **84** Plan the route for descent to take into account the position of tools and equipment and how the rope(s), friction saver etc will be retrieved, once climbers are on the ground.
- ❑ **85** Climbers must descend to the ground in a controlled manner to avoid the excessive build-up of heat that could damage PPE components. Ensure that anchor devices are also lowered in a controlled manner.

Storage

- ❑ **86** Check, maintain and store all tree-climbing equipment in accordance with manufacturer's instructions. Dry wet equipment thoroughly before storage, eg in a well-ventilated environment away from any direct heat source.

Responsibilities of ground staff

- ❑ **87** Plan the job with the climber(s) before the work starts and be aware of the task(s) involved. On busy sites consider dedicating a specific member of the ground staff to each climber.
- ❑ **88** Maintain effective communication with climbers at all times.
- ❑ **89** Maintain concentration and watch the climbers. Anticipate their needs, passing up tools and other equipment, when required.
- ❑ **90** Keep climbing and work ropes on the ground free of knots, kinks, tangles, branch wood and clear of machinery. Keep ropes in safe positions, eg away from obstructions, vehicles, equipment and the public.
- ❑ **91** Ensure the precautions taken to exclude the public and traffic from the work area are maintained while work is in progress.
- ❑ **92** Keep tools and equipment which are not in use away from the immediate work area.
- ❑ **93** Control working ropes, but do not wrap a rope around any part of the body to gain extra grip or purchase.
- ❑ **94** Continually assess the operation and modify the work plan and risk assessment as necessary. If at any stage you are unsure, stop the work in progress and re-assess the operation.
- ❑ **95** Where possible share the workload with the climber(s).

Notes