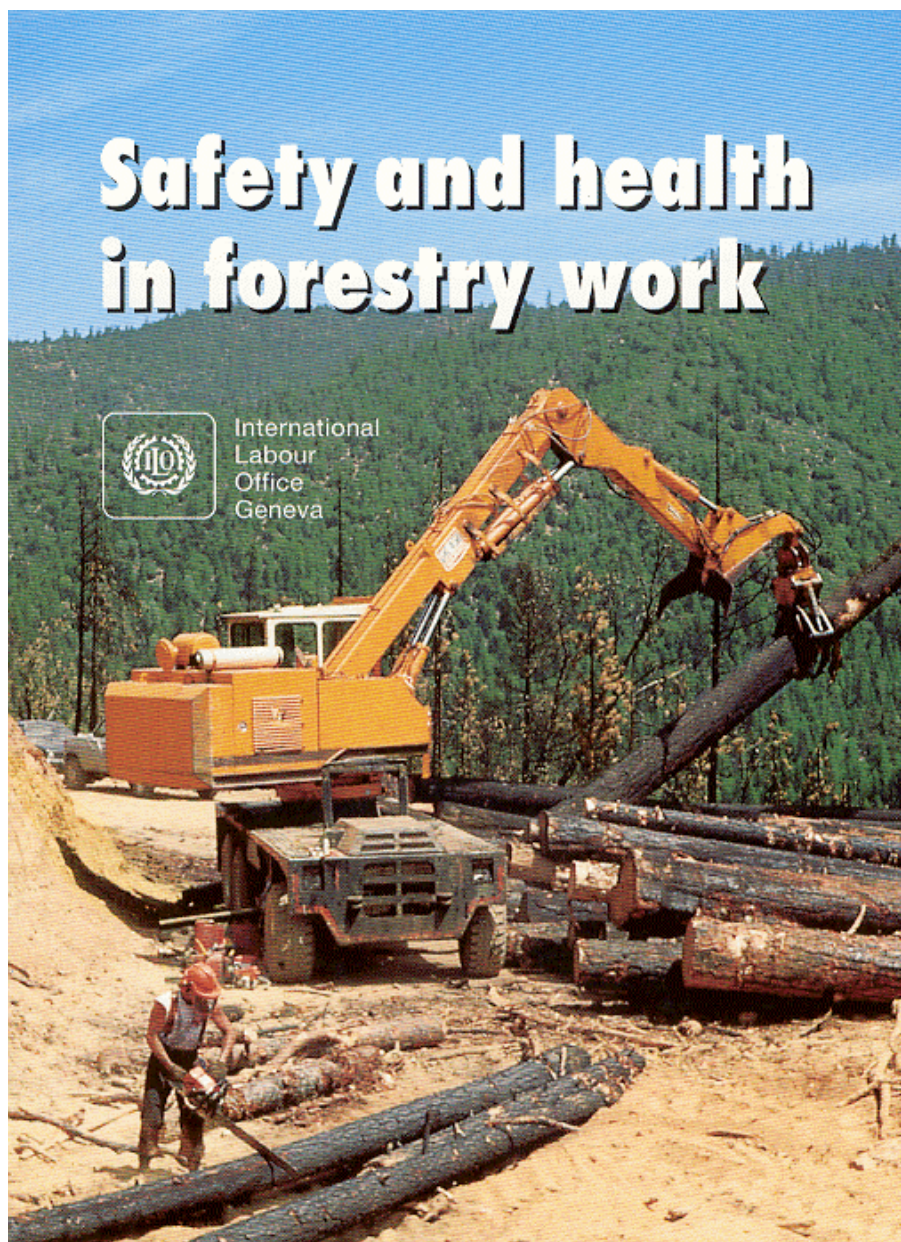


# Safety and health in forestry work



International  
Labour  
Office  
Geneva



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The *International Labour Organization* was founded in 1919 to promote social justice and, thereby, to contribute to universal and lasting peace. Its tripartite structure is unique among agencies affiliated to the United Nations; the ILO's Governing Body includes representatives of government and of employers' and workers' organizations. These three constituencies are active participants in regional and other meetings sponsored by the ILO, as well as in the International Labour Conference – a world forum which meets annually to discuss social and labour questions.

Over the years, the ILO has issued for adoption by member States a widely respected code of international labour Conventions and Recommendations on freedom of association, employment, social policy, conditions of work, social security, industrial relations and labour administration, among others.

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**Safety and health  
in forestry work**



**ILO code of practice**

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**Safety and health  
in forestry work**

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**International Labour Office    Geneva**

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## Preface

Forestry continues to be one of the most hazardous industrial sectors in most countries. Around the world, there are often discouraging trends of rising accident rates and a high incidence of occupational diseases and of early retirement among forestry workers. However, clear evidence shows that good safety and health performance in forestry is feasible. Many ILO constituents recognize that safety at work is not only an ethical imperative, but that it makes "dollars and sense". In forestry, it is also a prerequisite for environmentally sound management and utilization of natural resources. Significantly, these governments, enterprises, employers' and workers' organizations are willing to do something about it.

This code is not a legally binding instrument intended to supersede national legislation. It has been designed to provide guidance to ILO constituents in their endeavour to improve the safety and health performance of their national forestry sectors or enterprises. The code is based on state-of-the-art international experience, and is intended to be relevant and practicable in most countries and enterprises. It aims to protect workers from hazards in forestry work and to prevent or reduce the incidence of occupational illness or injury. It contains useful ideas even for countries and enterprises with well-developed prevention strategies, but is especially valuable for those that lack relevant regulations and guidelines.

The present code of practice was drawn up by a meeting of experts from major timber-producing countries, held in Geneva from 23 to 30 September 1997. In accordance with a decision of the ILO's Governing Body at its 265th Session (March 1996), the meeting was composed of 30 experts, ten following consultations with governments, ten following consultations with the Employers' group and ten following consultations with the Workers' group of the Governing Body<sup>1</sup>.

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## Safety and health in forestry work

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The meeting of experts unanimously adopted the text of this code, which was approved for publication by the Governing Body at its 270th Session (November 1997).

Important features are that:

- The code covers all types of forestry workers, including groups with above-average accident statistics, such as contractors, the self-employed and forest farmers.
- Safety is not an afterthought and it cannot be retrofitted. Therefore, the code does not focus on technical measures and safe performance, but emphasizes that safety starts at the top – at the national level, in the enterprise and at the worksite.
- It outlines a safety management system for enterprises that integrates safety into overall enterprise management.
- It provides for training and skill certification as key conditions for safety in forestry.
- It offers detailed technical guidance on logging and on some high-risk operations like tree climbing, harvesting of windfall and forest fire-fighting. This guidance is intended to help countries and companies that have no forestry-specific regulations.

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## **Safety and health in forestry work**

This code applies to:

- all organizations, whether legislative or advisory, whose activities influence the safety, health and welfare of those engaged in forestry work;
- employers, those in control of premises, workers, service contractors and self-employed people, as appropriate to their duties and responsibilities for safety and health;
- all forestry activities.

It may also be useful for landscape gardeners and others involved in work relating to trees that are not in forests.

Ideally, tripartite committees should adapt the code to circumstances in a country or enterprise, and integrate its provisions into overall codes of forestry practice that cover all performance requirements for forestry operations, including productivity, environmental concerns and safety. The ILO is actively promoting the development of such national codes. It is ready to provide advice and technical assistance to its constituents on training, on the formulation of national codes, or on any other aspect concerning this code of practice.

Requests for further information or assistance may be directed to:

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## **Objective**

1. The objective of this code is to protect workers from occupational safety and health hazards in forestry work and to prevent or reduce the incidence of illness or injury by providing practical guidelines on:

- (a) the key components of safety policies and procedures at national, enterprise and worker levels as an effective means of communicating minimum requirements to all persons concerned, and as an aid to the planning and organization of work;
- (b) the establishment of a framework for consultation and cooperation on safety, health and welfare involving those who create the risks, those who are subsequently exposed to these risks and those bodies which are responsible for inspection and enforcement of regulations and standards;
- (c) basic requirements governing the execution of forest operations so that risk of injury or ill health is minimized;
- (d) a system for recording, reporting and monitoring occupational accidents and diseases and dangerous occurrences which may be used to measure compliance with requirements and/or the effectiveness of steps already taken to enhance the status of safety and health;
- (e) a framework for the allocation of responsibility among the various organizations and individuals which collectively contribute to a positive attitude to safety and health, and which ensure that safety and health have equal ranking with other operational goals and considerations.





## **Scope and application**

2. This code applies to:
- (a) all those organizations, whether legislative or advisory, whose activities influence the safety, health and welfare of persons engaged in forestry work, as appropriate to their function;
  - (b) all those individuals at the level of the enterprise or undertaking, i.e. employers, persons in control of premises, workers, service contractors and self-employed persons, as appropriate to their duties and responsibilities for safety and health;
  - (c) all forestry activities, including the establishment and regeneration of forests, silvicultural work and forest protection, timber harvesting and transportation.

3. The provisions of this code should be considered as minimum requirements and are not intended to replace applicable laws, regulations or accepted standards laying down higher requirements. More stringent applicable requirements should have priority over the provisions in this code.

4. The protection of workers in radioactively contaminated worksites is an important issue beyond the scope of this code. Scientific expertise on safety and health practice is currently limited and should be encouraged so that adequate protection standards can be developed. Forest workers should obtain proper information regarding radioactive contamination in affected forest areas, and they should be supplied with and wear appropriate personal protective equipment, and be provided with dosimeters. Managers and supervisors should endeavour to reduce possible risks and hazards to workers. Special personal hygiene facilities for decontamination and treatment of personal protective equipment and tools should be available at the worksite, and regular medical examinations and preventive treatment should be provided to workers in accordance with legal regulations and established guidelines.

5. The code contains references to those institutions responsible for the provision, delivery and award of vocational qualifications. Such institutions are urged to review existing curricula in the light of the code's recommendations for training and the allocation of worksite responsibilities.



## Definitions

6. In this code the following terms have the meaning assigned to them in the definitions below:

(*Note:* a glossary of technical terms used is provided at the end of the code; in the text they are marked: (➡)).

*Commissioning party:*

A physical or legal person giving out work under a contract for services through a contractor or self-employed person.

*Competent authority:*

A minister, government department, or other public authority having the power to issue regulations, orders or other instructions having the force of law.

*Competent person:*

A person possessing adequate qualifications, such as suitable training and sufficient knowledge, experience and skill for the safe performance of the specific work. The competent authorities may define appropriate criteria for the designation of such persons and may determine the duties to be assigned to them.

*Contractor:*

A person or enterprise used to perform forest operations to a given specification at a predetermined cost under the terms of a contract for services, but not under a contract of employment. For the purpose of this code contractors include subcontractors.

*Dangerous occurrence:*

Readily identifiable event as defined under national laws and regulations, with potential to cause an injury or disease to persons at work or the general public.

*Employer:*

- (i) Any physical or legal person who employs one or more workers in forestry work; and
- (ii) as the context requires, the principal contractor, the contractor or the subcontractor.

*Enterprise:*

An institutional unit – or the smallest combination of institutional units – that encloses and directly or indirectly controls all necessary functions to carry out its own production activities.

*Forestry worksite:*

Any site at which forestry activities are carried out.

## **Safety and health in forestry work**

### *Inclement weather:*

A condition caused by adverse climatic factors such as heavy rain, strong winds, ice and/or snow or thunderstorms which may lead to accidents or acute ill health, unless work is suspended.

### *Incident:*

An unsafe occurrence arising out of or in the course of work where no personal injury is caused, or where personal injury requires only first-aid treatment.

### *Labour inspection:*

The periodic and structured examination of a worksite by a person with a specialized knowledge of typical forest operation and the statutory and non-statutory requirements relevant to occupational safety and health.

### *Manager:*

A person appointed and legally responsible for the management and technical direction of all or part of a forestry enterprise.

### *Notification:*

A procedure, specified in national laws and regulations, for establishing the way in which:

- (a) the employer or self-employed person submits information concerning occupational accidents, commuting accidents, dangerous occurrences or incidents; or
  - (b) the employer, the self-employed person, the insurance institution or others directly concerned submit information concerning occupational diseases;
- as appropriate and as prescribed by the competent authority.

### *Occupational accident:*

An occurrence arising out of or in the course of work which results in:

- (a) fatal occupational injury;
- (b) non-fatal occupational injury.

### *Occupational disease:*

A disease contracted as a result of an exposure to risk factors arising from work activity.

### *Occupational safety and health services:*

Services entrusted with essentially preventive functions and responsible for advising the employer, the workers and their representatives in the enterprise on:

- (a) the requirements for establishing and maintaining a safe and healthy working environment to facilitate optimal physical and mental health in relation to work;
- (b) the adaptation of work to the capabilities of workers in the light of their state of physical and mental health.

*Recording:*

A procedure, specified in national laws and regulations, for ensuring that the employer or self-employed person maintains information on:

- (a) occupational accidents and diseases;
- (b) commuting accidents; and
- (c) dangerous occurrences and incidents.

*Reporting:*

A procedure, specified by the employer in accordance with national laws and regulations and with the practice at the enterprise, for the submission by workers to their immediate supervisor, the competent person, or any other specified person or body, of information on:

- (a) any occupational accident or injury to health which arises in the course of or in connection with work;
- (b) suspected cases of occupational diseases;
- (c) commuting accidents; and
- (d) dangerous occurrences and incidents.

*Risk:*

The product of the chance that a specified undesired event might occur, and the severity of the consequences of the event.

*Safety and health committee:*

A committee set up to advise on safety and health matters. The composition of such a committee includes representatives of employers and workers.

*Safety and health management:*

Those aspects of the overall management function that develop, implement and maintain the enterprise safety and health policy.

*Safety and health management system:*

The enterprise structure, responsibilities, practices, procedures and resources for implementing safety and health management.

*Screening criteria:*

The values or requirements against which the significance of the identified hazard or effect can be measured. They should be based on sound scientific and technical information and may be developed by the enterprise and industry or tripartite bodies, or provided by the regulators.

*Supervisor:*

A person responsible for the day-to-day planning, organization and control of a forest operation.

*Weekly working hours:*

Working time – which may include commuting time to and from the worksite, in accordance with national legislation.

## **Safety and health in forestry work**

### *Worker:*

In the context of this code, any person engaged in forestry.

### *Workers' compensation:*

Payment of compensation to workers or their families in the event of a temporary or permanent incapacity to work resulting from an injury or occupational disease sustained at or in connection with work.

### *Workers' representative:*

Any person who is recognized as such by national law or practice, in accordance with the Workers' Representatives Convention, 1971 (No. 135).

### *Workplace:*

All places where workers are required to be by reason of their work and which are under the control of an employer.

## **Part I. General principles, legal framework and general duties**

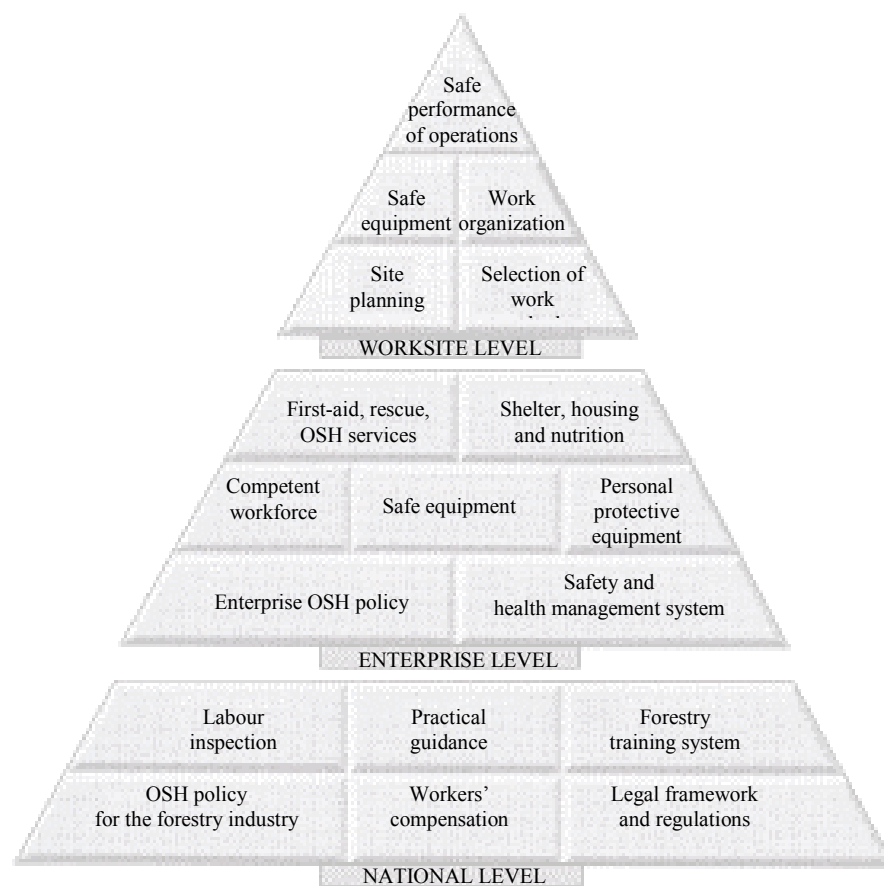
### **1. General principles**

7. Satisfactory safety and health levels are achieved when a number of closely related principles have been applied at national, enterprise and worksite levels (see figure 1, overleaf). These principles include compliance with laws and regulations, and a clearly defined policy which identifies the nature and severity of the risks associated with forestry operations as well as the allocation of responsibility to those persons employed at the levels of management, supervision and execution.

8. It is recognized that forestry enterprises vary considerably in terms of size, scope, economic stability and culture. These differences should not, however, serve as a justification for diluting the application of those general principles essential to the promotion of working conditions which prevent or reduce the risk of injury or ill health.

## Safety and health in forestry work

Figure 1. Safety and health measures at national, enterprise and worksite level



Note: OSH = Occupational safety and health.

Source: Draft *Code of practice on safety and health in forestry work* (Geneva, ILO, 1997), p. 5.



## **2. Legal framework and general duties**

### Legal framework and duties of competent authorities

9. The competent authorities should:
  - (a) devise and maintain a national policy; and
  - (b) adopt laws or regulations to ensure the safety and health of workers employed in forestry activities and to protect persons at, or in the vicinity of, a forestry worksite from all risks which might arise as a result of the work activity.
10. National policy and laws and regulations on occupational safety and health should be determined in consultation with the recognized organizations of employers and workers.
11. Laws and regulations should be flexible enough and reviewed at appropriate intervals to facilitate their adaptation to technological developments, new situations and standards. Setting protection objectives rather than prescribing specific preventive measures is one way of achieving such flexibility.
12. Laws or regulations should be supplemented in practice by technical standards, codes of practice or authoritative guidance, consistent with national conditions and practice.
13. The competent authorities should, through appropriate measures such as regulations and inspections, aim at ensuring that forestry workers benefit from the protection of regulations which are as effective as those which apply in other industrial sectors.
14. The competent authorities should ensure that all forestry workers, irrespective of their employment status, benefit from the same level of safety and health protection and are subject to the same requirements for prevention.
15. Laws and regulations should place particular responsibilities on employers, persons having control of premises, manufacturers, designers, suppliers of materials, workers and contractors.
16. National laws or regulations ought to provide that:
  - (a) employers have the main responsibility for safety and health in forestry work;
  - (b) employers are responsible for installing and maintaining work systems and methods which are safe and without risk to health;
  - (c) employers should give all necessary training and instruction to ensure that workers are competent to carry out safely the tasks assigned to them;
  - (d) employers should install a system whereby accidents, dangerous occurrences and occupational diseases are reported, recorded and investigated, and ensure that the necessary adjustments are made to prevent or reduce the incidence of these accidents, dangerous occurrences and occupational diseases in the future;

## **Safety and health in forestry work**

- (e) persons with actual control over or primary responsibility for premises – i.e. forest owners, main contractors, local managers and supervisors – should ensure that such premises are safe and without risk to health;
- (f) manufacturers, designers and suppliers of forestry equipment and substances should be responsible for ensuring that their products are adequately designed and constructed so that they are safe and without risk to health, when properly used;
- (g) workers should cooperate with their employers to ensure compliance with the legal duties imposed upon employers;
- (h) workers should be obliged to take all reasonable steps to secure their personal safety and that of any other person who may be at risk as a result of their acts or omissions at work;
- (i) measures are taken to ensure that there is close cooperation between employers and workers to promote safety and health in forestry work. Such measures should include, where appropriate:
  - the establishment of safety and health committees with representatives of the employer and workers, which have well-defined powers and duties;
  - the appointment of elected workers' safety delegates with well-defined powers and responsibilities;
  - the appointment by the employer of suitably qualified and experienced persons to promote and advise on safety and health matters;
  - the training of both safety delegates and committee members;
- (j) contractors should be obliged to comply with all of the applicable foregoing paragraphs according to their status and contractual clauses relevant to safety and health;
- (k) employers should participate with all relevant parties in the establishment of a system of rehabilitation for workers who have been injured in work-related accidents or who have contracted occupational diseases.

17. Laws or regulations should establish the skill levels required for the safe performance of forestry work for various categories of workers and specify the procedure which tests these skills and certifies them as being adequate.

18. The competent authorities should support the establishment and operation of a training system catering to the needs of the forestry sector. Particular attention should be paid to access to training for the self-employed, contractors, forest farmers and woodlot owners working in forests.

19. Laws or regulations should specify the legal requirements in respect of the contracting and subcontracting of forestry activities. These may include:

- (a) regulations to cover contractors and their workers;
- (b) registration/licensing of contractors based on competence and business autonomy;
- (c) liability and duties of all signatories to the contract.

20. Laws and regulations should:

- (a) provide coverage through workers' compensation in the event of occupational accidents and diseases, and compensation for survivors in the event of work-related death;

- (b) specify which types of occupational accidents and diseases are within the scope of compensation;
- (c) extend coverage to all workers in forestry, irrespective of their employment status; and
- (d) identify those authorities which are responsible for administering workers' compensation.

21. The agencies or organizations responsible for making payments to workers should be consulted when setting technical standards and laws and regulations.

22. Insurance rates should be related to the safety and health compensation record of individual enterprises under a bonus/malus system which provides a financial incentive, provided this system is not used to discourage workers from reporting work-related accidents and health problems.

23. Laws and regulations should determine concepts and terminology relating to occupational accidents and diseases and specify which categories or types of occupational accidents and diseases, commuting accidents, dangerous occurrences and incidents are subject to the requirements for reporting, recording, notification, investigation and monitoring; they should also indicate the respective procedures to be used.

24. For the definition of concepts and the establishment of arrangements at national and enterprise level for the reporting, recording, notification and investigation of occupational accidents and diseases and the keeping of related statistics, the provisions of *Recording and notification of occupational accidents and diseases: An ILO code of practice* (Geneva, ILO, 1996) should apply.

25. The competent authorities should:

- (a) provide adequate inspection services in order to advise on, administer and enforce the application of the provisions of laws and regulations;
- (b) establish adequate penalties for violations of laws and regulations;
- (c) specify the rights and duties of inspectorates in enforcing safety and health at work;
- (d) provide inspection services with the resources necessary to accomplish their task; and
- (e) install a monitoring system to ensure that inspection is carried out effectively.

### Duties of labour inspectorates

26. Labour inspectorates should monitor compliance with and enforce all relevant laws and regulations at the workplace.

27. Labour inspectorates should aim to support the employers' and workers' own measures to improve levels of occupational safety and health.

28. Forestry operations are frequently carried out in remote worksites which are dispersed and often change location, and the work is typically undertaken by small groups of workers. These factors combine to make the enforcement of laws and regulations more difficult than in many industrial sectors. Many hazards may be attributed to a hostile environment rather than to inadequate requirements compounded

## **Safety and health in forestry work**

by negligent behaviour. Many working practices are based on an opinion as to what is safe and what is not. Laws and regulations cannot be expected to cater for every variable; however, laws should provide a sound basis for safe and healthy work practices.

29. In these circumstances enforcement staff should be familiar with the special problems associated with forestry and able to provide support and advice accordingly.

30. The rights, procedures and responsibilities of safety and health inspectors should be communicated to all those who may be affected. The nature of enforcement action, especially the circumstances which may lead to prosecution in the courts, is of particular significance.

31. Labour inspectorates should periodically carry out worksite inspections, ideally in the presence of the employers' and workers' representatives.

32. Labour inspectorates should advise employers and their workers on the safe performance of activities, particularly on the choice and use of safe working methods and appropriate personal protective equipment.

33. Following an inspection, the findings should be notified to the personnel concerned so that any remedial action might be promptly introduced. These findings should be debated by local safety committees, where they exist, or with representatives of workers' organizations.

34. Labour inspectorates should monitor the safety requirements and performance of enterprises in the forestry sector in order to provide feedback for further development and improvement of safety measures.

35. Labour inspectorates should participate, in cooperation with the recognized organizations of employers and workers, in the formulation and updating of safety rules and additional safety measures to be adopted at national and enterprise levels.

36. Inspection of operations and the measurement of compliance with regulations and requirements should not be seen as a matter exclusive to legally appointed inspectors. Employers and those with analogous status should introduce an enterprise-based procedure in order to identify and remedy non-compliance and/or define new standards in circumstances where these have been neglected or overlooked, thus ensuring that safety and health becomes a dynamic and high profile management objective.

37. Enterprise-based inspection should apply in the same way to workers in the enterprise itself and contractors to prevent dual standards from developing. All personnel should be aware of the sanctions which will be imposed in the event of malpractice.

## **Responsibilities and duties of employers**

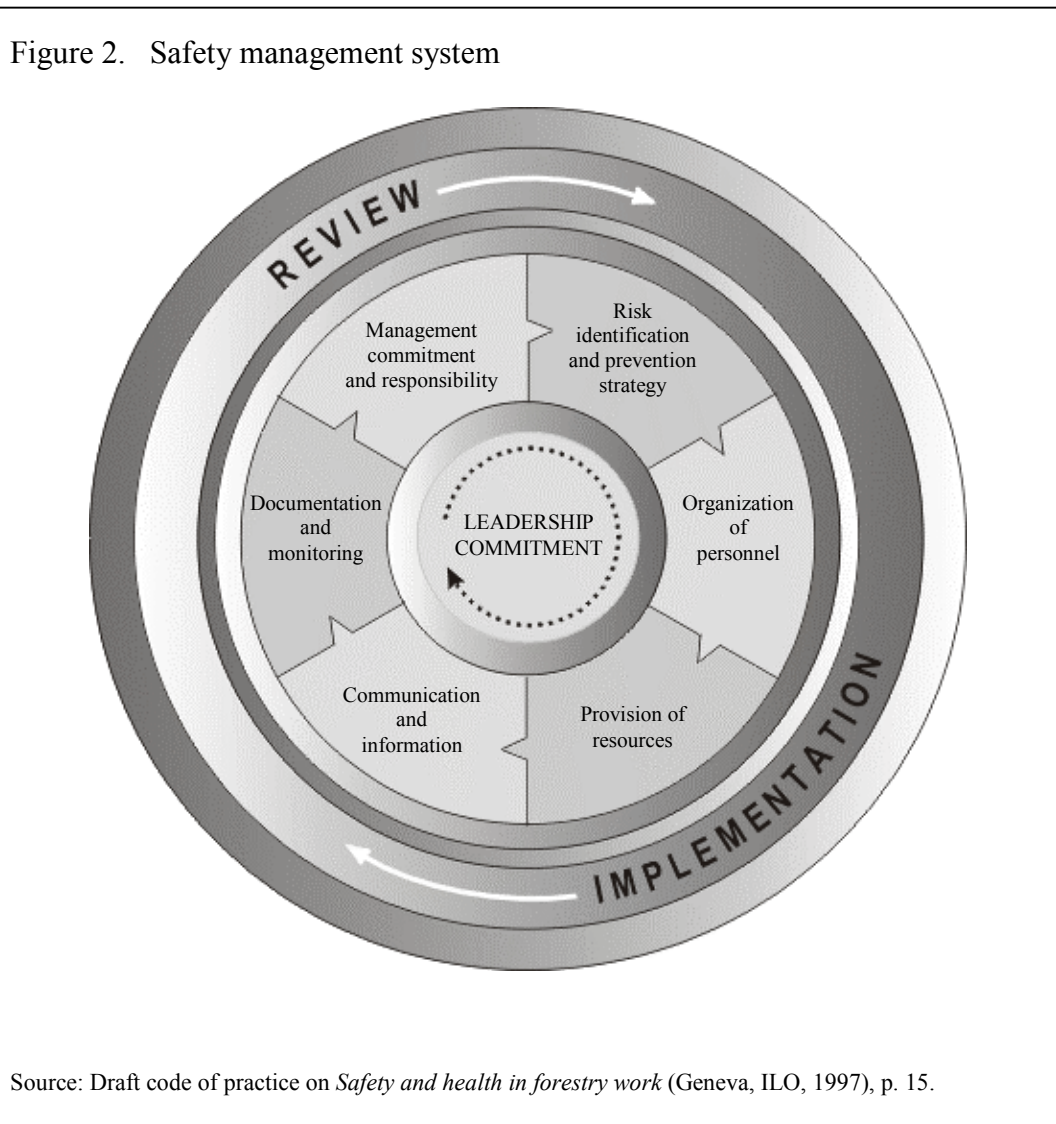
38. Employers are primarily responsible for occupational safety and health in the enterprise. They must make every effort to reduce hazards at, or in the vicinity of, forestry worksites to as low a level as possible.

39. Employers should ensure compliance with all relevant laws, regulations and codes of practice regarding safety and health. They should develop and implement adequate requirements of their own, where laws and regulations have not been enacted.

40. Employers should initiate and maintain a safety culture in the enterprise, including a system of moral and material rewards and incentives for all personnel involved.

41. When possible, employers should establish committees with representatives of workers and management or make other suitable arrangements for the participation of workers in promoting safe working conditions.

42. Employers should establish and maintain a safety and health policy and a corresponding management system at enterprise level in accordance with the provisions of Chapters 3 and 4 of this code (see figure 2).



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43. Employers should systematically identify the hazards and likely effects on safety and health which may be caused or arise from forestry activities, involving managers, supervisors and workers in this identification procedure, as appropriate.

44. Employers should assign workers only to those tasks for which they are suited by age, physique, state of health and skill.

45. Employers and commissioning parties contracting out services should promote stability and low rates of turnover among their workers and contractors.

46. When using contractors, the commissioning party should ensure that:

- (a) the same safety and training requirements apply to the contractors and their workers as to the workers in the enterprise;
- (b) where required, only such contractors are used that have been duly registered or hold licences;
- (c) contracts specify safety and health requirements as well as sanctions and penalties in case of non-compliance. Contracts should include the right for supervisors mandated by the commissioning party to stop work whenever a risk of serious injury is apparent and to suspend operations until the necessary remedies have been put in place;
- (d) contractors who repeatedly violate their contractual obligations are excluded from future bidding.

47. Employers should ensure that all workers, as well as contractors and their workers and self-employed persons, are:

- (a) sufficiently educated and trained in the tasks they are assigned to and hold the relevant skills certificates;
- (b) informed about all identified risks for safety and health in their respective activity;
- (c) suitably instructed in the hazards connected with their work and environment, as well as trained in the precautions necessary to avoid accidents and injuries to health;
- (d) made aware of the relevant laws, regulations, requirements, codes of practice, instructions and advice relating to prevention of accidents and diseases;
- (e) informed of their individual and collective responsibility for safety and health;
- (f) sufficiently instructed in the use and protective effects of and the care of personal protective equipment.

48. Employers should maintain procedures to ensure and increase the competence of workers through identification of training needs and provision of appropriate training.

49. In particularly hazardous operations employers should ensure that only persons assigned to carry out the work are present at the worksite.

50. In accordance with the provisions of Chapter 6, employers should:

- (a) ensure that all equipment, tools and machines which are required for safe working are available;
- (b) ensure that all equipment, tools and machines are maintained in safe and in serviceable condition;

- (c) ensure that a sufficient supply of tools, spare parts for machines and personal protective equipment is available at the worksite;
- (d) provide appropriate and safe means for transport of personnel, tools, equipment and material to and from the worksite;
- (e) ensure that camps and mobile shelters are adequate.

51. Personal protective equipment and protective clothing as stipulated in Chapter 7 should be provided and maintained by the employer, without cost to the workers, whenever prescribed by laws and regulations.

52. Employers should arrange for the regular inspection by a competent person at suitable intervals of all equipment, tools, machines, personal protective equipment and workplaces under the control of the employer in accordance with relevant regulations, requirements or codes of practice.

53. Employers should provide such supervision as will ensure that workers and contractors perform their work with due regard to their safety and health, and ensure that supervising personnel are competent and have the necessary authority and resources to carry out their duties effectively.

54. On dispersed sites and where small groups of workers operate in isolation, employers should establish a checking system by which it can be ascertained that all the members of a crew, including operators of mobile equipment, have returned to the camp or base at the close of work.

55. Employers should ensure that all forest operations in their enterprise are planned, organized and carried out in accordance with the provisions of Chapters 6 and 7 and Part IV of this code, or in line with practices they can demonstrate provide at least the same level of protection.

56. Employers should establish and maintain records on occupational accidents and diseases as prescribed by regulations and under Chapter 11 of this code, and ensure that all records, documents and relevant information concerning safety and health which relate to their activities are kept readily available for the information of workers or their representatives, contractors, labour inspectorates, the workers' compensation authority and other parties concerned.

57. Employers should provide regular medical examinations, particularly for the detection of relevant occupational diseases of all workers. Employers should provide preventative medication and vaccinations recommended by competent medical services, where such medication and vaccinations are not provided by public health services and other institutions.

58. Employers should ensure that first aid, rescue and medical care are available as required.

59. Where there is an imminent and serious danger to safety, health or the working environment, employers or their representatives should take immediate steps to stop the operation and evacuate workers as appropriate.

60. Whenever workers work together on a worksite under different employers or contractors, the employers should cooperate with each other. Cooperation should include mutual information on hazards to safety and health arising from their activities,

## **Safety and health in forestry work**

the coordination of measures for protection against these hazards and clear arrangements for supervision.

### **Duties of managers and supervisors**

61. Managers and supervisors should implement the enterprise's safety and health policy, including through the selection of safe equipment, work methods and work organization and the maintenance of high levels of skill. They should endeavour to reduce risks and hazards to safety and health in the activities for which they are responsible to as low a level as possible.

62. Managers and supervisors should ensure that workers and contractors receive adequate information on safety and health regulations, policies, procedures and requirements in accordance with Chapter 4 of this code and satisfy themselves that this information is understood.

63. Managers and supervisors should assign tasks to their subordinates in a clear and precise way. Managers and supervisors should satisfy themselves that workers understand and implement the safety and health requirements.

64. Managers and supervisors should ensure that work is planned, organized and carried out in such a way as to minimize the risk of accidents and the exposure of workers to conditions that may lead to injury or damage their health (see Chapters 6 and 7 and Part IV for guidance).

65. In consultation with workers, managers and supervisors should assess the need for additional instruction, training or further education of workers by monitoring compliance with safety requirements.

66. When managers or supervisors observe non-compliance with safety and health regulations or codes of practice by a worker under their supervision, they should immediately take appropriate action. If such action is unsuccessful, the problem should be referred to a higher level of management immediately.

67. Supervisors should verify:

- (a) compliance with safety regulations;
- (b) maintenance of safe working techniques;
- (c) use and care taken of personal protective equipment;
- (d) care taken of tools, machines and equipment, particularly any devices which are provided in the interest of safety.

68. Supervisors should be responsible for monitoring the compliance by contractors and their workers with the requirements for occupational safety and health stipulated in their contracts. In the event of non-compliance, supervisors should provide appropriate instruction and advice to contractors and their workers accordingly. If the supervisor's action is not effective, the matter should be reported immediately to senior management.



## **Responsibilities and duties of contractors**

69. Contractors employing workers should be regarded as employers for the purposes of this code. The provisions pertaining to the responsibilities and duties of an employer in Chapter 2 should apply to such contractors accordingly.

70. Contractors should be registered or hold licences where required by law or regulation or where recognized voluntary schemes exist.

71. Contractors and their workers should be required to hold appropriate skills certificates.

72. Contractors should comply with all laws and regulations concerning terms of employment, workers' compensation, labour inspection and occupational safety and health.

73. Contractors should be aware of and operate according to the commissioning parties' policies and strategies for the promotion of safety and health and should comply and cooperate with related measures and requirements.

## **Rights and responsibilities of workers**

74. All workers should cooperate closely with employers to promote safety and health.

75. Workers or their representatives should have the right and duty to participate in all safety- and health-related matters, particularly by participating in safety and health committees.

76. Workers should have the right to obtain proper and comprehensive information from their employer regarding safety and health risks and measures relating to their functions. This information should be presented in a form and language which the workers readily understand.

77. Workers should take reasonable care of their own safety and health and that of other persons who may be affected by their acts or omissions at work.

78. Workers should comply with all prescribed safety and health measures.

79. Workers should make proper use and take good care of all personal protective equipment and clothing.

80. Workers should not operate or interfere with tools, machines and equipment that they have not been duly authorized to operate, maintain or use.

81. Workers should report any accident or injury to health which arises in the course of or in connection with work to the responsible supervisor or manager at the end of the shift.

82. Workers should report forthwith to their immediate supervisor, without prejudice to themselves, any situation which they have good reason to believe presents an imminent and serious danger to their life and health, to that of others or the working environment.

83. Workers who have removed themselves from a work situation which they have reasonable justification to believe presents an imminent and serious danger to their life

## **Safety and health in forestry work**

or health should be protected from undue consequences in accordance with national conditions and practice.

84. Workers who report such a situation to their supervisor should not be required to return to the work situation until the matter has been rectified.

85. Where workers believe that measures for safety and health protection provided by their employer are insufficient or inappropriate, or believe that their employer is failing to comply with laws, regulations and codes of practice regarding safety and health, such workers and their representatives should have the right to bring this to the attention of labour inspectorates or other competent bodies, without prejudice or detriment to themselves.

86. Workers should have the right to appropriate medical examination by a mutually agreed medical practitioner, without cost to themselves, where they have good grounds to believe that an activity or a work situation might have caused an injury to health. This medical examination should be provided irrespective of any medical examination for detection of occupational diseases, which should in any case be undertaken regularly with the cooperative participation of workers.

## **Duties of manufacturers and suppliers of equipment and substances**

87. Manufacturers and dealers of tools, machines, equipment and substances manufactured and sold for use in forestry should ensure that all tools, machines and equipment:

- (a) are of good design and construction, taking into account safety, health and ergonomic principles;
- (b) comply with relevant national and international safety requirements as laid down in international standards and recommendations (see Chapters 6 and 7 and Part IV as well as the references in this code);
- (c) are tested and certified according to laws or regulations (see Chapter 8 of this code).

88. Manufacturers and suppliers should provide comprehensive and understandable instructions and information:

- (a) on hazards to safety and health connected with the use of tools, machines, equipment and substances;
- (b) on the safe use of tools, equipment and substances;
- (c) about all aspects of maintenance;
- (d) about personal protective equipment required when using specific tools, machines, equipment and substances; and
- (e) on the need for training to operate tools, machines and equipment and to use substances safely;
- (f) in the language required.

89. Manufacturers should continuously improve, by means of technical and organizational measures, the safety and health aspects of tools, machines, equipment and hazardous chemicals manufactured for use in forestry, taking into account the most recent ergonomic research findings, in order to reduce hazards to

## **Legal framework and general duties**

safety and health to as low a level as possible. In particular, the design of chainsaws should be improved further in order to reduce health hazards.

90. Manufacturers should consider hazards to safety and health arising from the use of tools, machines and equipment when new equipment is being designed, or improvements or adjustments are made to existing equipment.



## **Part II. Framework for safety and health at the enterprise level**

### **3. Enterprise safety and health policy**

91. The management of safety and health should be considered as a high priority management task. The management of an enterprise involved in forestry work should be aware of its responsibility for and actively promote safety and health.

92. As a basis for safety and health management, all enterprises should, in consultation with the workers concerned, prepare, publish and maintain a policy which clearly describes the nature of the hazards associated with their forestry operations and the steps they intend taking to prevent or reduce the effect of such hazards and work-related accidents.

93. The safety and health policy and related strategic objectives should:

- (a) have equal status with the enterprise's other policies and objectives;
- (b) be explicit, operational and amenable to monitoring and evaluation. The enterprise should be committed to meet or exceed all relevant regulatory and legislative requirements;
- (c) be consistent with the enterprise's general policy and be periodically reviewed;
- (d) aim at fully integrating safety and health into the overall organization and operations of the enterprise.

94. The safety and health policy and the management system for its implementation should aim, in the following order of priority, at:

- (a) eliminating the risk;
- (b) controlling the risk at source;
- (c) minimizing the risk by means that include the safe design of work systems and organization of work;
- (d) ensuring that personal protective equipment is used if, in spite of the provisions above, there is still an element of risk.

95. The extent and precise nature of a safety and health policy will clearly depend on the size and scope of the enterprise, but certain key components should be incorporated. These are:

- (a) the recruitment and training of personnel;
- (b) the identification of those personnel who have been assigned specific responsibilities in the area of safety and health. This should include the name or job title of the individual and the precise nature of his or her responsibilities. The aim should be to avoid ambiguity and to demonstrate the commitment of the management hierarchy, irrespective of its size and structure;

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- (c) the provision of plant, equipment and substances in order to ensure a safe and healthy working environment;
- (d) arrangements for liaison with other bodies concerned, for example legislators, workers' organizations, public utilities such as water and electricity authorities, and organizations responsible for environmental conservation;
- (e) the function and constitution of the safety and health committee, if such exists or is intended;
- (f) procedures for the enforcement of safety requirements adopted by the enterprise whether by laws and regulations or otherwise;
- (g) procedures for the reporting of accidents, dangerous occurrences and occupational diseases (see also Chapter 11);
- (h) the means by which the policy will be communicated to all those involved, including the date on which the policy will be reviewed and, as necessary, revised;
- (i) emergency procedures.

## **4. Safety and health management**

### Assignment of responsibility

96. Workers should be made clearly aware of their individual and collective responsibility for safety and health matters. Measures should be taken to ensure that the personnel are competent and have the necessary authority and resources to perform their duties effectively.

97. Irrespective of the size and structure of the enterprise, senior managers should be appointed to develop, oversee and control safety and health standards. They should be the focal points to which problems will be addressed, including the recording and notification of occupational accidents and diseases (see Chapter 11).

98. Line managers at all levels should be responsible for safety and health matters. These matters should constitute part of their overall responsibilities and be incorporated into job descriptions as part of management tasks.

99. In those enterprises where periodic job appraisal has been introduced, safety and health performance should be reviewed in the same way as other aspects of work-related objectives.

100. Safety and health measures require teamwork. Managers, supervisors and operatives should therefore discuss potential and actual problems on a regular basis. Attention should be focused on finding a positive and cost-effective form of prevention, rather than on debate in the aftermath of a serious incident.

### Identification and management of risks

101. Employers should establish and maintain procedures to identify systematically the risks to safety and health which may affect, or arise from, forestry activities.

102. The identification should include hazards and risks actually and potentially leading to occupational accidents and diseases, incidents and emergency situations.

103. For each task and activity a risk evaluation should be carried out. Any risks should be identified and recorded.

104. Procedures should be maintained to evaluate risks and effects from identified hazards against screening criteria, taking account of the frequency with which they occur and the likely severity of consequences for safety and health.

105. Based on the results of risk evaluation, enterprises should define objectives for the reduction of such risks to as low a level as possible, and devise and implement corresponding preventive measures. These should include the routine application of site inspection and planning as well as of the principles of work organization set out in Chapter 12.

## **Safety and health in forestry work**

106. Managers, supervisors and workers should, as appropriate, be involved in the identification of risks and of their effects on safety, health or the working environment.

### **Organization of personnel**

107. Management safety and health representatives should be delegated the authority and made accountable for coordinating, implementing and maintaining safety and health strategies. This in no way reduces the responsibility of line management for safety and health concerns.

108. Although supervision should be considered of major importance for the achievement of safety and health objectives, workers' motivation to comply with safety regulations is crucial for the prevention of accidents and health risks. Motivation should be reinforced by appropriate measures developed and applied by managers and supervisors. Such measures should include appropriate information about the enterprise's economic and safety objectives, training and education, and incentives. Positive reinforcement of safe behaviour through recognition and financial reward should be given precedence over punitive sanctions.

109. Safety and health committees should be established wherever practicable. They should include workers or their representatives, employers' representatives and as far as practicable a competent physician. Safety and health committees should meet regularly. They should participate in the decision-making process related to occupational safety and health-related issues.

110. Procedures should be maintained at enterprise level to ensure that contractors whose services are used or who work on the premises of the enterprise comply with its safety- and health-related objectives and requirements. Procedures should facilitate coordination of contractors' activities with those of the enterprise and with those of other contractors.

111. Procedures to ensure competence should apply both at initial recruitment and whenever a new task is assigned to a person. Skills testing is a reliable and valid technique in this respect.

112. Employers should establish procedures to secure and enhance the competence of personnel through identification of training needs and provision of appropriate training for all workers. Training needs can be accurately forecast at the time when work programmes and budgets are being decided.

### **Provision of resources**

113. Sufficient resources should be allocated to ensure the effective implementation and maintenance of safety and health measures.

114. Resource allocation should include among others:

- (a) facilities, tools and equipment required to meet legislative and other adopted standards;
- (b) an organized infrastructure to respond to and mitigate the effects of accident risks and health hazards;



- (c) availability of management for reviewing and auditing standards;
- (d) assessment of future needs arising from new technical or legal developments.

115. Resource provision should be reviewed regularly as part of a general review of safety and health measures. Supervisors and workers should be encouraged to draw attention to any perceived shortcomings.

### **Communication and information**

116. Employers and any persons using the services of contractors should establish and maintain procedures to ensure that workers, contractors and self-employed persons are aware of the:

- (a) requirement to comply with the enterprise's policies and strategies and their individual roles and responsibilities;
- (b) potential consequences for safety and health resulting from deviation from prescribed standards;
- (c) procedure for suggesting improvements in safety and health strategies.

117. Employers should provide adequate information to workers about all identified risks to safety and health in their respective work activity.

118. Contractors should be sufficiently informed about the safety objectives and safety standards applying to the forest worksites in the area where they are contracted.

119. Information should be given to workers and contractors in a language that they understand. Special measures may be required when there are people working in an enterprise who speak different languages.

120. In order to ensure the full integration of safety and health concerns into forestry operations, general codes of forestry practices or operations manuals should incorporate safety and health regulations and advice alongside provisions pertaining to quality, productivity, environmental and other aspects.

121. For easy reference, concise and illustrated leaflets or cards to be used on site should be prepared for each major function or operation. These should incorporate safety and health measures into general work instructions and specifications.

### **Documentation**

122. All relevant information concerning safety and health should be maintained and periodically updated in the enterprise's database and should be readily available for the information of workers or their representatives, contractors, inspectors, workers' compensation bodies and any other parties concerned. This may include relevant accident costs.

123. Documentation should include:

- (a) safety and health policies and strategic objectives;
- (b) safety and health measures and strategies;

### **Safety and health in forestry work**

- (c) the tasks and responsibilities of management, supervisors, workers and contractors;
- (d) the findings of risk evaluation and risk management, including a list of all hazardous substances used in the workplace;
- (e) records on occupational accidents, occupational diseases and dangerous occurrences which have been reported or notified.

(For guidance on documentation see Chapter 11.)

## **Part III. General requirements**

### **5. Workforce**

#### Employment conditions

124. High turnover in the workforce may increase operating costs and the risk of accidents. Employment should therefore encourage low turnover.

125. Working hours should not exceed the number prescribed by national laws or collective agreements where applicable. The ILO Reduction of Hours of Work Recommendation, 1962 (No. 116), should be considered a guide for improving health and safety in the workplace.

126. Working hours should be arranged so as to provide adequate periods of rest which include:

- (a) short breaks during working hours;
- (b) sufficient breaks for meals;
- (c) daily or nightly rest;
- (d) weekly rest.

Particularly in physically demanding work, operatives should be encouraged to take short breaks during working hours to recover their vigilance and physical fitness. Ideally, the duration and frequency of breaks and rests should be prescribed by laws and regulations or collective agreements.

127. Where shift work and night work present undue hazards, they should be minimized. Where night work is required, lighting and other safety and health conditions should be managed to ensure that shift risks do not exceed those in daytime operations.

128. To achieve the goals for safety and health described in this code, all personnel must make an effective contribution. This implies that workers should be only assigned to tasks for which they are suited.

129. Pregnant women should only be employed to do light work and should not lift and carry loads at all; contact with hazardous chemical substances should also be avoided.

130. Persons who have not reached the age of completion of compulsory schooling or who are under the age of 15 years must not be employed in any case. Persons under the age of 18 years should not be employed in tasks that have been assessed, in consultation with employers, workers and their organizations concerned, as likely to jeopardize the safety and health of young persons.

131. The consumption of alcohol or drugs can have a negative impact on safety at the workplace. A person whose normal functions are impaired should be prohibited from the worksite. Each enterprise should develop a policy on how to manage alcohol- and drug-related issues at the workplace. Guidance on this is provided in the ILO code of practice *Management of alcohol- and drug-related issues in the workplace* (see list of references and further reading).

## Qualifications of managers, supervisors and operatives

### **Qualifications of managers and supervisors**

132. Managers and supervisors should be in possession of an appropriate qualification, preferably one which is nationally recognized, ensuring that they are able to:

- (a) plan and organize forestry operations;
- (b) establish and maintain a safety management system;
- (c) monitor the status of safety and health in those operations for which they are responsible;
- (d) take remedial action in the event of non-compliance with requirements.

### **Training and skills testing for operatives**

133. No person should perform forestry work if they do not have the required level of skill and knowledge.

134. Unskilled persons, either new entrants to the industry or workers assigned to new jobs, are especially likely to have accidents. Effective training should therefore be part of the safety policy of the undertaking.

135. Workers such as contractors and their workers, the self-employed, forest farmers and woodlot owners may be disproportionately exposed to accidents. Training should be made available to various groups, taking into account the content, duration and location. Mobile training units are a good way of providing access to training.

136. The required level of skill and knowledge should be defined and objectively assessed through skills tests leading to certification by an authorized body. This procedure may be integrated with formal training or conducted at the worksite.

137. Prior to initial assignment to a specific task all workers should undergo appropriate training. This training should have clearly defined learning objectives, be structured and be conducted by a qualified instructor. It should include:

- (a) information about the purpose of the task and the methods and techniques to be used;
- (b) information about safety and health hazards;
- (c) use and maintenance of tools and machines;
- (d) selection and use of any personal protective equipment;
- (e) assessment of performance for effectiveness and safety.

138. Training outcomes should be tested to make sure that workers can cope with the assigned task and acquire sufficient skill to perform it without endangering themselves, others and the working environment. Test results should be recorded, certified and notified to the client.

## Qualifications of contractors

139. Contracts for services should contain standard clauses requiring contractors to employ only workers who possess relevant skill certificates, and to comply with national and enterprise safety standards.

140. Voluntary or mandatory registration systems for contractors should be established which make good safety performance a prerequisite for registration. Contractors' associations with voluntary membership can be an effective means of promoting safety and health among contractors.

## **6. Safety requirements for tools, machines and hazardous chemicals**

141. Because of the wide variety of tools, machines, hazardous chemicals and work methods used in forestry, this code cannot give a detailed description of safety requirements for all the tools, machines and hazardous chemicals available. Coverage cannot be exhaustive, either in terms of the selection of tools, machines and hazardous chemicals, or in the level of detail provided; but general principles will be described.

142. The use of hazardous chemicals should be minimized where possible. The ILO code of practice entitled *Safety in the use of chemicals at work* (Geneva, ILO, 1993) and *Safety and health in the use of agrochemicals: A guide* (Geneva, ILO, 1991) provide guidance on safe use.

143. Guidelines for the safe use and operation of tools and machines in specific forestry operations are described in Part IV of this code.

### **General requirements**

144. All tools, machines and hazardous chemicals used in forestry should:

- (a) comply with safety and health requirements as prescribed in international or national standards and recommendations, wherever these are available;
- (b) be used only for work for which they have been designed or developed, unless a proposed additional use has been assessed by a competent person who has concluded that such use is safe;
- (c) be used or operated only by workers who have been assessed as competent and/or hold appropriate skill certificates.

145. Tools, machines and equipment should be of good design and construction, taking into account health, safety and ergonomic principles, and they should be maintained in good working order.

146. Appropriate checklists which are based on a complete assessment of all relevant criteria should be used when selecting a machine. This helps to create a healthy and productive working environment and ensure that the machine is suitable for its intended purpose.

(*Note:* Publications containing ergonomic checklists relevant to forestry are included in the References and further reading – see Apud et al., 1989; Apud and Valdés, 1995; BLVB, 1995; FAO, 1992; Golsse, 1994; and KWF, 1995.)

147. Employers, manufacturers or agents should provide comprehensive and clear instructions and information on all aspects of operator/user maintenance and the safe use of tools, equipment and hazardous chemicals. These should include any requirements for personal protective equipment as well as the need for training.

148. Equipment should be so designed as to allow easy and safe maintenance and minor repair at the worksite. Workers should be trained to do maintenance and

minor repairs on machines and tools themselves. Where this cannot be ensured, a competent person should be in easy reach of the worksite.

149. Facilities for repair and maintenance of tools and equipment should be provided, preferably close to shelters or housing facilities. Mobile shelter wagons with separate maintenance compartments for minor repair and maintenance work on chain-saws and hand tools are recommended.

150. In camps, provision should be made for workshop facilities with a good selection of appropriate maintenance tools, to allow maintenance and repair work to be carried out under safe conditions, without exposure to inclement weather conditions.

### Hand tools

151. Hand tools for cutting and splitting should be manufactured from good quality steel which maintains its cutting edge and effectiveness with the minimum amount of maintenance.

152. The head of a tool for cutting and splitting should be fixed securely onto the handle with an effective device, for example a wedge, rivet or bolt.

153. Handles should provide a secure grip and should be made of good quality wood or other materials suitable for this purpose.

154. The specification of tools, such as size, length of handles and weight, should be appropriate to cater for the needs of the work and the physical attributes of the user.

155. When not in use, sharp-edged tools should be sheathed with an appropriate device.

### Machinery, portable

156. The controls of machines such as chain-saws, brush saws and grass-cutters must be conveniently placed and their function clearly marked.

157. The position and dimension of the handles must be comfortable for the operator in all normal working modes.

158. Levels of noise, vibration and harmful exhaust emissions should be as low as possible in line with the state of the technology. Biodegradable fuels and chain oils can significantly reduce hazards from exposure to exhaust gases and spilling.

159. Machines should be as light as practicable to strike a balance between the machine size and power required for the job on the one hand, and the avoidance of operator fatigue and damage to the musculo-skeletal system on the other.

160. All protective devices must be in place and regularly inspected for apparent defects. The engine-stopping device must have a positive action and be clearly marked.

## Safety and health in forestry work

161. The design of chain-saws should comply with international regulations on safety features, such as the European Committee for Standardization publication "European Standard EN 608: Agricultural and forestry machinery – Portable chain-saws – Safety" (Brussels, 1994).

### Machinery, self-propelled or activated by prime mover

162. Machines should be equipped with shock-absorbent, fully adjustable seats for drivers and fitted with safety belts meeting at least the requirement of ISO 8797 or its national equivalent.

163. Interior space and machine controls should be designed and located to suit the physique of the operators most likely to use such machines.

164. The means of access to and exit from machinery, such as steps, ladders and doors, should be designed to provide hand and footholds of a convenient height and spacing.

165. All pulleys, shafts, belts and fan blades should be securely guarded.

166. Machines should be equipped with a roll-over protection structure, in accordance with ISO 3471 and ISO 8082 or an appropriate national standard.

167. Cabins should be:

- (a) protected against falling objects, in accordance with ISO 8083 or an appropriate national standard;
- (b) equipped with operator protective structures at least meeting the requirements of ISO 8084 or its national equivalent.

168. Engines should be equipped with a stopping device which is not self-returning, clearly marked and easily reachable from the operator's normal working position. The engine starter should be interlocked with the transmission or clutch so as to prevent the engine from starting if left in gear.

169. Parking brakes must be capable of keeping the machine and its rated load stationary on all slopes likely to be encountered.

170. Exhaust pipes should be equipped with spark arresters. Engines equipped with turbochargers do not need spark arresters.

171. First-aid kits and fire extinguishers should be available on every machine, and the operators should be trained in their use.

172. Machines should be equipped with all-wheel drive where required for safe performance.

173. Machines for hauling timber should be so designed that a minimum of 20 per cent of the total axle weight is located on the steering axle during operation.

174. Operators should hold the relevant skills certificates for operating and maintaining the specific machine they are using.

175. While a machine is being serviced or repaired, the engine should be switched off unless required when carrying out the repair or adjustment.



176. Before working on the hydraulic system of a machine or a part powered by the system, such as a harvester head, the operator should ensure that the machine is switched off, that the hydraulic pump is disengaged, that hydraulic pressure is released, that all elements are chocked to prevent movement or lowered safely to the ground.

177. When fitting a new hydraulic pipe the operator should ensure that connections are compatible.

178. Lubrication and hydraulic oils which are not toxic, which do not provoke allergies and skin reactions and which are environmentally benign, such as biological oils, should be used if feasible.

179. No person other than the operator should be authorized to ride on a machine unless it is legally permitted and a seat is provided for that purpose.

180. The operator should keep the safety belt fastened when driving the machine.

### Winches and chokers

181. Winch controls should be designed to be operated from inside the cabin or from another safe position.

182. Winches should be designed and fitted to the base machine as close to the ground as possible, in order to maintain a low centre of gravity and to enhance stability.

183. Winch cables for forestry use should incorporate a safety factor of at least twice the pulling capacity of the winch; for example, a three-tonne winch should be fitted with a cable of at least a six-tonne notional breaking strain. This also applies to chokering equipment.

184. Chokering systems should allow logs to be pulled in freely.

185. Good communications between members of the crew are essential, preferably by use of a two-way radio system. Clear and unmistakable visual or acoustic signals should be agreed upon; any signal that is not understood means "STOP!".

### Cable cranes

186. These systems require highly specialized technical knowledge for planning, installation and operation. Only personnel adequately trained should be assigned to this task.

187. Winches and carriages should be equipped with an efficient braking system.

188. Technical specifications and instructions should be available and complied with, especially concerning the angles for cables and guy ropes, anchors (➡) and the maximum safe load. A factor of safety must be incorporated into the specification of both static and moving cables (see also Chapter 14 of this code).

## 7. Work clothing and personal protective equipment

### General provisions

189. Working clothes should be manufactured from materials which keep the workers' body dry and at a comfortable temperature. For work in hot and dry climates, appropriate clothing should be used to avoid excessive thermal insulation and allow respiration. Adequate protective clothing should be provided where there is a risk of UV radiation or biological hazards, such as poisonous plants, animals and infections.

190. Clothing should be of a colour that contrasts with the forest environment, to ensure that workers are clearly visible.

191. The use of personal protective equipment should be regarded as a last resort, when risk reduction by technical or organizational means is not feasible. Only in these circumstances should suitable personal protective equipment having regard to the specific risks be used.

192. Personal protective equipment for forestry work should include the relevant items listed in table 1, which identifies personal protective equipment required for specific tasks.

193. When tasks are performed using hazardous chemicals, personal protective equipment should be provided in accordance with *Safety in the use of chemicals at work: An ILO code of practice* (Geneva, 1993).

194. Personal protective equipment should comply with international or national standards.

195. There should be a sufficient supply of necessary personal protective equipment readily available to ensure that operatives are consistently aware that safety and health is of paramount importance.

### Personal protective equipment appropriate for forestry operations

196. Each employer should evaluate the need for personal protective equipment in the prevailing conditions. Table 1 shows the generally accepted practices in the use of this equipment. Workers should be provided with personal protective equipment as specified in table 1, except where the employer can demonstrate that no or other protective equipment affords the same or a higher level of protection.

**Table 1. Personal protective equipment (PPE) appropriate for forestry operations**

Parts of the body to be protected:	Feet	Legs	Trunk, arms, legs	Hands	Head	Eyes	Eyes/face	Hearing
PPE normally appropriate:	Safety boots or shoes <sup>1</sup>	Safety trousers <sup>2</sup>	Close-fitting clothing	Gloves	Safety helmet	Goggles	Visor (mesh)	Ear muffs <sup>3</sup>
<b>Operation</b>								
<i>Planting</i> <sup>4</sup>								
Manual	✓			✓ <sup>5</sup>				
Mechanized	✓		✓					✓ <sup>6</sup>
<i>Weeding/cleaning</i>								
Smooth-edged tools	✓			✓		✓		
Handsaw	✓			✓				
Chain-saw	✓ <sup>7</sup>	✓	✓	✓ <sup>8</sup>	✓	✓	✓	✓
Brush saw								
- with metal blade	✓	✓	✓	✓	✓	✓	✓	✓
- with nylon filament	✓	✓		✓		✓		✓
Rotating knife/flail	✓		✓	✓				✓ <sup>6</sup>
<i>Pesticide application</i>								
	To comply with those specified for the particular substance and application technique							
<i>Pruning</i> *								
Hand tools	✓ <sup>9</sup>			✓	✓ <sup>10</sup>	✓		
<i>Felling</i> <sup>11</sup>								
Hand tools	✓		✓	✓ <sup>12</sup>	✓			
Chain-saw	✓ <sup>7</sup>	✓	✓	✓ <sup>8</sup>	✓		✓	✓
Mechanized	✓		✓		✓			✓
<i>Debarking</i>								
Manual	✓			✓				
Mechanized	✓		✓	✓		✓		✓ <sup>6</sup>
<i>Splitting</i>								
Manual	✓			✓		✓		
Mechanized	✓		✓	✓		✓		✓
<i>Extraction</i>								
Manual	✓			✓	✓ <sup>13</sup>			
Chute	✓			✓	✓ <sup>13</sup>			
Animal	✓			✓	✓ <sup>13</sup>			
Mechanized								
- skidder	✓		✓	✓ <sup>14</sup>	✓			✓ <sup>6</sup>
- forewarder	✓		✓		✓			✓ <sup>6</sup>
- cable crane	✓		✓	✓ <sup>14</sup>	✓			✓ <sup>6</sup>
- helicopter	✓		✓ <sup>15</sup>	✓ <sup>14</sup>	✓ <sup>16</sup>	✓		✓
<i>Stacking/loading</i>								
	✓		✓	✓	✓			✓ <sup>6</sup>
<i>Chipping</i>								
	✓		✓	✓	✓		✓	✓ <sup>6</sup>
<i>Tree climbing</i> <sup>17</sup>								
Using a chain-saw	✓ <sup>7</sup>	✓	✓	✓ <sup>8</sup>	✓ <sup>18</sup>	✓		✓
Not using a chain-saw	✓				✓			

Notes: \* If pruning involves tree climbing above 3 m, a fall restricting device should be used. <sup>1</sup>With integrated steel toe for medium or heavy loads. <sup>2</sup>Safety trousers incorporating clogging material, in hot climates/weather chain-saw leggings or chaps may be used. Safety trousers and chap contain fibres that are inflammable and melt, and should

**Table 1. Personal protective equipment (PPE) appropriate for forestry operations (cont.)**

not be worn during fire-fighting. <sup>3</sup>Ear plugs and ear valves not generally suitable for forestry because of risk of infection. <sup>4</sup>For planting of chemically treated plants and for dipping of plants in chemicals see relevant section of Chapter 13. <sup>5</sup>When planting spiny seedlings or chemically treated plants. <sup>6</sup>When noise level at work position exceeds 85dB(A). <sup>7</sup>Chain-saw boots with protective guarding at front vamp and instep. <sup>8</sup>Cut-resistant material incorporated in the back of the left hand. <sup>9</sup>When falling branches are likely to cause injury. <sup>10</sup>When pruning to a height exceeding 2.5 m. <sup>11</sup>Felling includes debranching and crosscutting. <sup>12</sup>When using a handsaw. <sup>13</sup>When extracting near unstable trees or branchwood. <sup>14</sup>Only if manipulating logs; gloves with heavy-duty palm if handling wire choker rope or tether line. <sup>15</sup>Highly visible colours. <sup>16</sup>With chin strap. <sup>17</sup>For required tree-climbing equipment see Chapter 15 of this code. <sup>18</sup>Climbing helmets are preferable: if they are not available, safety helmets with chin straps may be used.

Source: Draft *Code of practice on safety and health in forest work* (Geneva, ILO, 1997), p. 24.

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## **8. Testing and certification of equipment**

### General provisions

197. All equipment used in forestry work should undergo appropriate testing to ensure that it is designed and constructed according to safety requirements as required by laws and regulations and/or as described in Chapters 6 and 7 of this code.

198. Equipment should be tested and certified to inform both purchasers and users about the quality and suitability of the equipment for the purpose for which it will be used.

199. Testing and certification should preferably be performed only by institutions accredited by the competent authorities.

### Testing procedures and criteria

200. Testing procedures should be adequate to ascertain whether the tested equipment is designed and manufactured to meet the requirements of national laws and regulations.

201. When national or international standards for testing procedures are available, they should be followed.

202. Testing criteria should include ergonomic aspects. Particularly in the case of personal protective equipment, they should include comfort, reliability and efficiency.

203. When testing machines, specific ergonomic checklists should be used which contain questions on important characteristics of machines. Unsatisfactory aspects should be noted together with recommended changes and potential problems.

204. Test results should be unambiguous and easy to understand.

205. Test results should be published and made available to dealers, distributors and purchasers.

### Certification

206. Machines and equipment which meet the test criteria should be certified by the institution or appropriate competent authority.

207. Certified equipment should be clearly marked, in accordance with the specific requirements of the competent authority.

208. Employers, their equivalents, and safety and health inspectors should ensure that only successfully tested and certified equipment is used.

## **9. First aid, emergency rescue and occupational health services**

### **First aid**

209. Since it is common that forestry workers work in small groups at separate locations, every worker should be trained in basic first aid. This training should include the treatment of open wounds, and resuscitation. In areas where the work involves the risk of intoxication by chemicals or smoke, snake-, insect- or spider-bites or other specific hazards, first-aid training should be extended accordingly in consultation with an appropriately qualified person or organization.

210. First-aid training should be repeated at regular intervals to ensure that knowledge and skills do not become outdated or forgotten.

211. The provision of first-aid facilities and trained personnel should be prescribed by laws and regulations.

212. Well-maintained first-aid kits or boxes should be readily available at the worksite and should be protected against contamination by moisture and debris. These containers should be clearly marked and contain nothing other than first-aid equipment.

213. All operatives should be informed of the location of the first-aid equipment and the procedure for obtaining stocks.

### **Rescue**

214. Provision should be made for the quick evacuation of a person in the event of an injury or illness which requires medical assistance.

215. Transport or a means of communication should be available at the worksite to contact rescue services in case of an emergency. The functioning of the communication arrangements should be checked.

216. All workers should be informed about the telephone number or radio call sign of the nearest hospital, ambulance station or physician. Information should also be given on the location of the worksite and a meeting point for transportation.

217. At permanent worksites a place should be provided where an ill or injured person might rest in comfort until the evacuation is under way.

218. Vehicles for transportation to a point where an ambulance can be met should always be available. If practicable and appropriate, helicopter landing areas should be designated and made known to all personnel present at the worksite.

219. Where professional help is not available within a reasonable distance, particularly in remote areas, consideration should be given to the creation of the necessary dispensing and health-care facilities.

### Occupational health services

220. The primary aim of medical examination or health questionnaires at or near initial recruitment is to protect individuals and to provide baseline data for further improvement of occupational health. Care must be taken to observe relevant human rights legislation.

221. To maintain good health and safety, all workers should cooperate to undertake periodic medical examinations.

222. Occupational health services should be provided by professionals who are qualified to deal with problems specific to forestry work. They should also pay attention to the development and safety of working conditions, equipment and work organization in forestry work.

### Medical care

223. Medical care for workers and their families should be provided if public health services are not available in the area where workers and their families live.

## **10. Shelters, housing and nutrition**

### Shelters and housing

224. Shelters should be made available for protection from inclement weather and for spending breaks, taking meals and drying and storing clothing, at or within easy access of the worksite.

225. If the climatic conditions require, shelters should be equipped with facilities for heating and warming food. As far as practicable, shelters should also provide facilities for washing. This is particularly important where workers are using chemical substances.

226. Where remote worksites require workers to live in camps, these should be situated so as to avoid flooding or other natural hazards; suitable accommodation with an adequate level of comfort and sanitation should be provided.

227. Camps should have the following:

- (a) dormitories, in which the number of people should not exceed six, to allow workers a minimum of privacy;
- (b) lockers for keeping personal belongings;
- (c) canteen;
- (d) kitchen;
- (e) food store;
- (f) sufficient supply of clean water;
- (g) sanitary facilities (washrooms, showers, toilets or latrines), separated from sleeping and dining areas and from kitchen facilities and storage areas for food, complying with hygienic requirements, and equipped in accordance with the cultural environment of the workers;
- (h) facilities for washing and drying clothes;
- (i) general material store;
- (j) separate stores for any inflammable, chemical or explosive substances at a safe distance from the living quarters;
- (k) recreational facilities;
- (l) means of control of rodents and harmful insects.

### Nutrition and drinking water

228. When food is provided by employers, they should ensure that the energy intake is sufficient for the performance of heavy physical work and that the diet is composed of a good balance of carbohydrates, fats and animal protein. Particularly in developing countries it should be recognized that inadequate or insufficient nutrition may result in health problems and a lack of productivity.

229. Bearing in mind that dehydration quickly reduces physical and mental ability, thus reducing productivity and increasing the risk of accidents, sufficient



supplies of safe drinking water should be available at the worksite. For physical work in hot climates up to 1 litre per hour may be required.

230. Forestry workers should be educated about the importance of sufficient nutrition and a balanced diet for their health and productivity, so that even workers who are not provided with food learn to provide themselves with a well-balanced diet and a sufficient quantity of food to meet the nutritional requirements of their work.

231. The persons in charge of the kitchen in a camp should be skilled in nutrition, sanitation and food-handling, should be licensed by a competent authority, and must be inspected regularly.

## **11. Reporting, recording, notification and investigation of occupational accidents and diseases**

### General provisions

232. Reporting, recording, notification and investigation of occupational accidents and diseases should be undertaken to:

- (a) provide reliable information about occupational accidents and diseases at enterprise and national level;
- (b) identify major safety and health problems arising from forestry activities;
- (c) define priorities of action;
- (d) evolve effective methods for dealing with occupational accidents and diseases;
- (e) monitor the effectiveness of measures taken to secure satisfactory levels of safety and health.

233. The competent authorities should in particular:

- (a) specify which categories or types of accidents, occupational diseases, dangerous occurrences and incidents are subject to requirements for reporting, recording, notification and investigation;
- (b) make appropriate arrangements for the necessary coordination and cooperation between the various authorities and bodies.

234. Workers and their representatives should be given appropriate information by the employers concerning the arrangements for reporting, recording and notification of information about accidents and occupational diseases.

### Occurrences subject to reporting and notification

235. The following should be subject to reporting and notification:

- (a) all fatal accidents;
- (b) occupational accidents causing loss of working time, other than insignificant loss;
- (c) all occupational diseases included in a national list or covered by the definition of such diseases affecting any person, whether employed or self-employed.

236. For the purposes of internal safety and health management, recording at enterprise level should be extended beyond the requirements stipulated above to cover commuting accidents, dangerous occurrences and accidents not causing loss of working time.

### Practice of reporting, recording, notification and investigation

237. The reporting, recording, notification and investigation of occupational accidents and diseases should follow standardized procedures to ensure the collection of reliable information.

## **Reporting, recording, notification and investigation**

238. All notifiable accidents and occupational diseases should be reported in writing using a standardized format.

239. The respective information on occupational accidents and diseases subject to notification and the prescribed standard form of notification should be specified by national laws and regulations.

240. The classification of specified kinds of information to be used for recording and notification at national and enterprise level should comply with the most recent versions of adopted international standard classifications, in particular those concerning economic activities (ISIC), occupations (ISCO), employment (ICSE) and occupational injuries and accidents (see References and further reading at the back of the book).

241. Occupational accidents and diseases should be notified, as required by laws and regulations, to:

- (a) the family of the accident victim, which should be informed as soon as possible;
- (b) the competent authority;
- (c) the appropriate compensation authority (for example social security or insurers);
- (d) the body compiling national occupational safety and health statistics;
- (e) any other body concerned.

242. Employers should establish and maintain records on occupational accidents and diseases as determined by the competent authority. Records on accidents and occupational diseases should be available and readily retrievable at all reasonable times.



## **Part IV. Technical guidelines for safety and health at the forestry worksite**

### **12. General provisions**

243. A wide variety of working methods are used in forestry operations, and the work consists of a multitude of different tasks. This code cannot therefore provide an exhaustive description of safety requirements for every possible variable used, either in terms of selection or detail. The methods covered in this part of the code have thus been selected on the basis of those methods and techniques in common use worldwide, and the activities involving the highest risks for the safety and health of forestry workers.

244. Work methods deviating in detail or totally from those described in this code may be used, if they are authorized by a competent body or if employers can demonstrate that such methods provide an acceptable level of safety and protection of health.

#### **Planning and organization of forestry work**

245. All forestry activities should be thoroughly planned and organized in advance to prevent inefficiency and to ensure proper levels and control of safe practice and work progress.

246. The planning and organization of operations should be based on a forest management plan which should indicate:

- (a) what type of work is necessary;
- (b) the objectives of the operation;
- (c) the location of designated worksites;
- (d) the time schedule for specific operations;
- (e) specifications for products or other outputs;
- (f) specifications for working methods to be used;
- (g) the person responsible for carrying out and supervising the operations;
- (h) a contingency plan in the event of bad weather or problems with equipment.

247. For each task the best and safest method available should be chosen. Use should be made of standardized methods which have been approved.

248. As far as practicable, manual and motor-manual work should be supported by machines, particularly to minimize lifting and carrying of heavy loads and to reduce hazards arising from the handling of power-driven hand-held machines.

249. Infrastructure requirements should be assessed prior to work, taking into account the present location, the traffic ability of roads and trails, and the need for additional installations. They should be planned according to the transport facilities used for personnel, material and produce.

## **Safety and health in forestry work**

250. Evacuation routes and procedures in case of emergency should be planned thoroughly.

251. The location of shelter facilities and storage for tools, equipment and material should be determined and prepared well in advance, in order to reduce the workload and to increase productivity by avoiding strenuous carrying of loads over long distances.

252. Appropriate means for transport of personnel, tools, equipment and material to and from the worksite should be provided and maintained in good condition.

253. The direction of work progress and transport boundaries should be identified and marked in the field before work is started. Sufficiently detailed maps of the work area are important tools for adequate planning of forest operations. In the case of harvesting operations, maps should be at scales from 1:2,000 to 1:10,000.

## **Site inspection and planning**

254. The variable environment in which forestry operations are carried out gives rise to many different situations. It is essential to evaluate environmental factors that have an impact on safety as part of the planning process.

255. Prior to the commencement of forestry operations at a new worksite a person assigned by management should conduct a risk assessment, as a means of identifying any characteristics prejudicial to safety and health. Both natural and man-made hazards should be noted. The risk assessment should consider in particular:

- (a) the topography of the land;
- (b) working methods and equipment to be used;
- (c) dangerous trees, such as toxic trees, dead or rotten standing trees and other worksite hazards;
- (d) consultations with the responsible party on standing live or dead trees that can be safely retained as natural habitat;
- (e) electricity or telephone lines, roads, hiking or skiing tracks or other infrastructure.

256. Identified hazards should be marked on a map of the area and on the ground, with a ribbon or barrier for example, whenever practicable.

## **Work organization**

257. The tasks and responsibilities of workers and supervisors should be clearly defined.

258. Clear instructions should be given to workers, in writing where appropriate, but at least verbally. These should include:

- (a) job specification;
- (b) location of the worksite;

- (c) required tools and machines;
- (d) identified risks and relevant safety rules;
- (e) required personal protective equipment;
- (f) information about rescue procedures in the event of an accident requiring evacuation;
- (g) need for liaison with other workers, including any contractors.

259. Work methods, tools and equipment should be safe and comply with ergonomic principles. If alternative work methods are available, the method involving the least hazards for safety and health should be chosen. The activities should be carried out in accordance with the prescriptions in the present part of this code.

260. To reduce prolonged unfavourable working positions and workloads inherent in certain jobs, workers should be encouraged to practise job rotation among the members of their group. This should be supported by training in different tasks and by organizational measures.

261. No person should be required to work in a location which is so isolated that assistance in case of an emergency cannot be summoned. Where forest workers are working in isolated situations, they should be linked to their base or their superiors by a reliable means of communication. Regular contact must be made during the workday, including contact at the end of the day. Where scheduled contact is not made, search and rescue operations should be undertaken immediately.

262. In any operation where cutting, extraction or loading is carried out, there should be a team of at least two workers who should be in visible or audible contact with one another. Exceptions to this requirement may be made for workers provided with two-way radios or mobile telephones or other effective means of communication.

263. Employers should conduct a briefing with workers before commencing work, informing them of the findings of the risk assessment and providing directives on how to deal with the hazards identified.

264. Supervision of work in progress should be entrusted to a trained and competent person in accordance with the provisions of Chapter 2.

265. If an operation becomes unsafe because of inclement weather conditions or darkness, work should be discontinued until conditions change to allow safe operations.

266. Where work during darkness is unavoidable, the worksite should be provided with enough lighting to maintain normal safety standards.

267. When unexpected hazards are encountered or a task cannot be performed in accordance with safe methods, such as described in the following chapters, work should be stopped and the competent supervisor consulted on how to proceed.

268. Where several crews, contractors or self-employed persons work on the same site, arrangements need to be made to ensure coordination and to assign and communicate responsibility for supervision.

## **Safety and health in forestry work**

269. Any work which poses a threat to the safety of visitors, including the general public, should prohibit unauthorized entry by signs, which may show for example "danger, tree felling" or "no entry, timber operations".

270. When dangerous operations are carried out along public roads, the road should be closed for a safe distance as long as such work is in progress. The length of the road closure should be agreed upon beforehand with the highways authority or the police.

## **Protection from unfavourable weather conditions and biological hazards**

271. Forestry operations are commonly undertaken in conditions exposing workers to unfavourable weather and biological hazards. Under these conditions special care should be taken to:

- (a) prevent heat-related illnesses;
- (b) protect workers from excessive UV radiation;
- (c) protect workers from weather/climatic conditions likely to contribute to injury or illness, such as rain, lightning, snow and low temperatures;
- (d) minimize discomfort caused by biting or stinging insects as far as practicable.

272. Workers should recognize the symptoms of heat-related illnesses and how to treat each condition.

273. To avoid heat-related illnesses a work regime should be developed and maintained which allows workers to rest in well-shaded sites.

274. Workers should be provided with appropriate clothing for protection of the body and head against inclement climatic conditions, in accordance with national and international standards. Work clothes made of cotton are generally well suited for work in hot weather/climates. It should be noted, however, that normal cotton shirts may not provide adequate protection against UV radiation in tropical and sub-tropical climates, and that sun Mockers may have to be used in addition.

275. Workers should be provided with effective insect repellents, if required by the conditions. When selecting and using an insect repellent, it should be noted that the application of such substances over long periods may cause serious skin and eye irritation, particularly in combination with intensive sunlight.

276. Whenever possible, work should be carried out when climatic factors are most favourable to the worker. The season of the year and the daily working hours can have a considerable influence on minimizing excessive exposure to sunlight, extremes of temperature and precipitation.



## **13. Silviculture**

### Site preparation

277. Where site preparation activities include the felling and conversion of trees, the provisions in Chapter 14 apply accordingly.

### **Manual clearing**

#### *Organization*

278. Hazards arising from dead trees or slash should be assessed prior to silvicultural operations. If necessary to avoid risks, dead trees should be made safe. If for any reason dangerous trees have to be retained, their location should be made known to all workers operating in the vicinity. A risk zone should be marked clearly and unmistakably.

279. If slash is going to be left on the site in heaps or piles, its position should be planned in advance to avoid hindrance to further activities.

280. The appropriate time of the year should be chosen for burning slash. Burning should only be undertaken when it can be controlled. Very dry or windy conditions should be avoided. The provisions for fire-fighting and fire management in Chapter 15 apply accordingly.

#### *Equipment*

281. Workload and work progress in manual clearing activities depend largely on the type of vegetation to be removed and density of vegetation and debris. Workload should be minimized by choosing appropriate tools for the specific type of vegetation:

- (a) for herbaceous vegetation, scythes or sickles should be used;
- (b) for removal of small woody growth, shears or saws should be considered as alternatives to brush hooks or machetes.

282. Tools used for site preparation operations should be designed, manufactured and maintained in accordance with the provisions in Chapter 6.

283. If site conditions vary significantly, workers should be supplied with a choice of different tools to allow the use of those most appropriate.

284. When the uprooting of stumps is necessary, all roots must be cut or broken to prevent them from falling back and causing injury. Pulling stumps out manually should be avoided as far as practicable; it is safer to use machine-mounted winches. When manual uprooting of stumps is unavoidable, poles or stakes of sufficient strength should be used as levers, to reduce physical effort.

285. Workers should be provided with and wear personal protective equipment in accordance with the provisions in Chapter 7.

## **Safety and health in forestry work**

### *Operation*

286. When using cutting tools, workers should keep a safe distance from other persons.

287. Workers should maintain a safe and balanced stance with a secure handle grip. The direction of the cutting must be away from the feet and legs.

## **Site preparation with hand-held machines**

### *Equipment*

288. For safety and ergonomic reasons, chain-saws should only be used where stem diameters exceed 100 mm. Where chain-saws are used for motor-manual clearing, the provisions in Chapter 14 apply accordingly. The lightest saw and shortest guide-bar practicable should be used for clearing activities.

289. Clearing-saws/brushcutters should be equipped with:

- (a) a clearly marked on/off switch;
- (b) vibration damping;
- (c) an adjustable suspension ring for harness;
- (d) blades suitable for specific types of vegetation;
- (e) a blade guard and blade cover.

290. For supporting the clearing-saw, workers should use a harness, adjusted to their bodies in accordance with the manufacturer's recommendations.

291. Workers should be provided with a spare blade and an adequate tool kit for corrective and preventive maintenance.

292. Workers should be provided with and use personal protective equipment in accordance with the provisions in Chapter 7.

### *Operation*

293. For the operation of chain-saws, the provisions in Chapter 14 apply.

294. Before starting work, clearing-saw operators should check that:

- (a) the blade guard is undamaged and securely fixed in a correct position;
- (b) the blade is seated correctly, is sharp and not cracked, and that the blade retaining nut is secure;
- (c) the balance of the saw is correct for the operating condition;
- (d) the handles give a comfortable working stance, the weight is spread evenly over both shoulders and the blade hangs straight in front of the worker's body;
- (e) the blade is stationary when the engine is idling.

295. Clearing-saw blades should always be kept sharp using file types as specified by the manufacturer. Blades with cracks or missing teeth must be changed immediately and discarded.

Figure 3. Safe use of brushcutters/clearing-saws



Source: Photograph provided by the Bundesverband der Unfallversicherungsträger der öffentlichen Hand e.V. (BAGUV), Munich.

296. When operating a clearing-saw, a safety distance of 15 m or twice the height of the stems to be cut, whichever is the greater, must be maintained between the operator and other persons.

297. A clearing-saw should always be used at full throttle for safe and smooth cutting.

298. The clearing-saw should be operated so that debris ejected by the saw is propelled into a safe zone.

299. The blade must not be touched when the engine is running.

300. When cutting woody material or where obstructions create a risk of kick-back, the 8-11 o'clock sector of the blade only should be used (see shaded area in figure 3).

301. For fuelling, the provisions for chain-saws in Chapter 14 apply.

## **Safety and health in forestry work**

### **Mechanized site preparation**

#### *Equipment*

302. Machines used for clearing should be designed, manufactured and equipped according to the provisions in Chapter 6.

#### *Operation*

303. When using a tractor or winch for pulling trees or stumps, the tractor must be securely braked and positioned at a safe distance from the tree or stump to be pulled. Pulling should be done with the winch and not by moving the tractor. Particular care should be taken on slopes in order to avoid the tractor overturning.

304. When wood chippers or mechanically operated rakes are used, a safety zone should be established to prevent injuries from flying debris or other moving material.

### **Planting**

#### **Organization**

305. Excessive debris should be piled in heaps or rows to facilitate access.

306. Work-rest schedules should be established to avoid acute or chronic fatigue (tree planter "burn out").

307. The maximum weight recommendations should not be exceeded (see Chapter 14, manual extraction).

308. Locations for plant storage and distribution should be pre-planned and as evenly spread over the planting area as possible, in order to keep transport distances as short as possible.

309. Planters should be trained to maintain optimal working postures, such as using the body weight to insert planting tools, so as to avoid back twisting and using the planting tool as a support when bending.

310. Each worker should undertake the planting and carrying of plants, in order to provide variety and avoid short-cycle repetitive planting work.

311. When planting on sloping terrain, the direction of planting should always be uphill, to avoid excessive bending of the back.

312. Workers should be informed when plants have been chemically treated. If treated plants have to be planted, workers should be instructed about the health risks arising from the chemicals used. Information and training must be provided on safe handling procedures and the requirements for personal protective equipment.

313. On large planting sites where workers are scattered, an audible assembly signal should be agreed upon in case of emergencies.

## **Planting of untreated plants**

### *Equipment*

314. When carrying trays of containerized plants or bundles of bare-rooted plants, suitable backpacks or harnesses with good weight distribution should be used, to reduce fatigue and the risk of injuries due to stumbling and falling when carrying heavy loads.

315. Manual transport of plants or seedlings over longer distances should be avoided as far as practicable, to safeguard the health of workers. If available, animals, vehicles, and particularly small off-road vehicles should be used.

316. Tools used for tree planting should be designed for the purpose. Agricultural and construction tools such as pickaxes are usually not suitable for tree planting.

317. Planting tools should be designed and manufactured in accordance with the provisions in Chapter 6.

318. When selecting specific planting tools, account should be taken of the size of the plants, the ground and soil conditions, and the body size of the workers.

319. Handles of planting tools should be designed to minimize the transmission of shock to the hand if the blade hits a hidden rock or root. They should be of contrasting colour for easy retrieval in the field.

320. Planting tool heads should be secure and the handle free from splinters and cracks.

321. Blades of planting tools should be kept sharp. For sharpening the blade, suitable files with handles should be available at the worksite.

322. The use of water-filled pails for carrying plants should be avoided. If bare-rooted plants have to be protected from drying out, wet peat moss or similar material should be used.

### *Operation*

323. Workers should maintain a balanced stance, keep the planting tool blade clear of their feet and legs and maintain a safe distance from other persons.

324. Workers should try to avoid striking any hard obstructions.

325. Tools should be carried in a safe manner, i.e. with the blade well away from the body.

## **Handling and planting of chemically treated plants**

326. Where chemicals must be used, the safe handling of hazardous chemicals and treated material prescribed by the producer must be followed strictly.

327. Treated plants and other contaminated material should be kept separate from rest and eating areas, stored personal clothing and other personal belongings.

## **Safety and health in forestry work**

328. Plants and containers should be clearly labelled with the full name of the chemical and its active ingredient, essential precautions, symptoms of intoxication and measures to be taken should intoxication occur. Workers should be informed about the above, preferably in writing.

### *Equipment*

329. For handling and planting trees treated with hazardous chemicals prior to the expiry of toxicity, employers should provide – and workers use – personal protective equipment. This should include:

- (a) a suitable protective bib and brace or overall made from chemical resistant material;
- (b) chemical-resistant boots;
- (c) chemical-resistant gloves.

330. Only chemicals which have been approved by the competent authority for the intended purpose should be used.

331. When plants have to be dipped in pesticides prior to planting, personal protective equipment should consist of:

- (a) a face-shield and suitable respiratory equipment which must cover nose and mouth;
- (b) a one-piece suit or trousers and a jacket with hood made from chemical-resistant material;
- (c) elbow-length chemical-resistant gloves.

### *Operation*

332. Arrangements should be made so that personal protective equipment and tools can be washed on-site, separately from personal washing.

333. Treated plants should be handled carefully to minimize personal contamination. They should be packed and transported on the worksite in such a way that access to the plants is easy, thus making it possible to avoid handling the plants more than necessary.

334. Planting bags or harnesses or other containers for transport of treated plants at the worksite should be cleaned by emptying and washing out daily. They should be manufactured using chemical-resistant material or lining.

335. Any contamination of the skin or protective clothing by a pesticide concentrate must be washed off immediately and thoroughly.

336. Workers feeling unwell should immediately report symptoms to the supervisor and seek medical advice as soon as possible, giving details of the work undertaken and the full name of the pesticide product used.

337. At the end of each work period workers should:

- (a) thoroughly clean the outsides of gloves and protective clothing, preferably with running water;

- (b) wash hands in soap and fresh water, not previously used to clean contaminated tools and protective equipment.

It should be prohibited for clothing or protective equipment which may be contaminated by chemicals hazardous to health to be laundered, cleaned or kept at workers' homes.

338. Planting-tool handles should be washed daily.

339. Care should be taken to ensure that washing waste does not contaminate watercourses.

### **Planting by hand-held power post-hole borer (rock drill)**

340. The correct augers for the type of operation and ground should be selected.

341. Hand-held post-hole borers should be operated and maintained according to the manufacturer's instructions.

342. Operators should ensure by frequent inspection that the machine is in a safe working condition.

343. The auger must remain stationary when the engine is idling.

344. Machines should be lifted using the leg and arm muscles and keeping the back straight.

345. The appropriate auger speed and drilling pressure for the conditions encountered should be maintained and the bit should not be forced.

346. When clearing the auger of any unwanted material, the engine must be switched off.

347. On sloping ground, operators should adopt a safe, well-balanced stance at the site to be drilled, keeping their feet well clear of moving parts.

348. When fuelling the machine, the prescriptions for chainsaws (Chapter 14) apply equally.

### **Tending**

349. The work area should be divided in manageable sectors to allow workers to keep a safe distance from others, as well as to have an overall view of their work progress and maintain an efficient work speed.

350. Tools appropriate to the diameter and the species of the trees being cut should be used.

351. Machines for mechanized tending should be designed and constructed according to the provisions in Chapter 6.

352. When using hand tools, chain-saws or clearing-saws for tending, the prescriptions in Chapter 14 apply, as do the provisions pertaining to personal protective equipment in Chapter 7.

## **Safety and health in forestry work**

353. Tools for the application of chemicals for killing standing trees should be designed so as to prevent workers coming into contact with these substances.

## **Pruning**

### **Organization**

354. Trees designated for pruning should be marked clearly.

355. High pruning from the ground using a saw with a long handle causes a high static load for the shoulders and arms, as well as an unfavourable neck position. This method should be avoided, particularly for pruning trees with large branch diameters. To avoid acute discomfort, the use of a ladder should be the preferred option.

356. If tree climbing is necessary, above 3 m, a device should be used that will minimize the risk of falling and allow optimal working postures.

### **Equipment**

357. Tools capable of reaching the pruning height required should be chosen.

358. Tools should be designed, manufactured and maintained in accordance with the provisions in Chapter 6.

359. It should be recognized that different tree species require a different saw-tooth configuration to minimize the workload and achieve high productivity.

360. Cutting edges should be maintained in sharp and clean condition.

361. The following equipment should be readily available at the worksite:

- (a) spare blades, a spare handle and securing devices, for example screws, bolts or rivets;
- (b) suitable files for sharpening the blade;
- (c) tools for blade replacement;
- (d) a solvent to clean blades;
- (e) blade protection for transport.

362. When working from ground level, head and eye protection should be worn.

363. Workers should wear personal protective equipment in accordance with the provisions in Chapter 7. Footwear should incorporate a non-slip sole to provide a good grip on both ground and ladder.

364. Ladders should be of light material and allow a safe stance. The steps should be of equal distance. The ladder should either be equipped so that it can be securely attached to the tree, or the base of the ladder should be 25 per cent of the climbing height away from the base of the tree.



**Operation**

365. Workers should:

- (a) maintain a safe working distance from other persons;
- (b) make sure that there is enough clear space so that the sawing action is unimpeded;
- (c) stand well clear of falling branches and other debris;
- (d) carry tools safely and cover blades when in transit.

## 14. Harvesting

### General provisions

366. Harvesting operations should be planned well in advance to promote efficiency and ensure proper guidance and control. This is particularly important where preparations have to be made, such as the planning and layout of extraction routes. When selecting work methods and equipment, planners should take the slope limitations of machines into account (see paragraph 436).

367. The organization should incorporate contingencies to cope with unexpected difficulties.

368. There should always be equipment on site or within easy reach to be able to take down hung-up trees safely.

369. A detailed transportation plan should be drawn up including:

- (a) the amount of timber to be harvested;
- (b) the specifications of produce and volume per assortment;
- (c) the means of transport to be used for extraction, for example, skidder, forwarder, cable-crane;
- (d) the direction of extraction routes and location of landings and road-side stacking areas.

370. All extraction routes and associated catchment areas should be clearly marked on maps as well as in the forest. In tropical forests or other areas where planning involves decisions about individual trees, the approximate direction of fall for each tree to be felled should be determined and marked on the tree using the extraction plan as a guide.

371. Dead or rotten standing trees involve an especially high risk of falling debris, and they often fall unexpectedly in any direction. They should be felled by highly skilled personnel, preferably in advance of the felling operation, using machines or other methods assessed as safe. If this operation has to be carried out motor-manually, work organization, which may include arrangements for remuneration, should ensure that safety has priority.

372. No felling, crosscutting or debranching should be undertaken in an area made hazardous by a leaning dead tree or a dead tree which has been brushed by a felled tree, until the tree causing the hazard has been felled.

373. During all operations the worksite should be kept as clear as possible. It should be large enough to allow machine operators to be able to retreat there safely and speedily in case of an emergency.

374. The work should be so planned as to minimize manual handling of timber. Accurate directional felling relative to the topography and extraction route is an important factor in achieving this.

375. As far as practicable, manual and motor-manual (chainsaw) felling operations should be assisted by machines, particularly to minimize the lifting and carrying of heavy loads and to reduce hazards arising from hung-up trees.

## Felling and conversion

### Manual and chain-saw felling

#### *Organization*

376. When planning the felling direction, the method of extraction and the route are important factors, because safety and productivity are highly dependent on how logs are positioned relative to the direction of extraction.

377. Felling areas should be divided into zones which should be clearly allocated to workers engaged in the operation, so that no two workers are closer than twice the length of the tallest tree to be felled. The felling zones should preferably be marked in the stand, for example by painting arrows on edge trees.

378. No persons should approach closer to the feller than twice the length of the tree being felled, unless the feller has acknowledged that it is safe to do so. In any event, no persons, other than the feller, should be at the base of the tree being felled, unless they are:

- (a) helping take down the tree;
- (b) exercising control on behalf of the management;
- (c) undergoing training as a feller;
- (d) needed to help overcome a specific felling difficulty and the feller has acknowledged that it is safe to do so.

379. Special care is required when work is carried out on slopes. If the gradient is steep, workers should not be allowed to work directly below others. Operations should be so planned as to prevent workers being exposed to rolling or sliding material.

#### *Equipment*

380. Depending on the diameter of the tree being felled, workers should be supplied with:

- (a) a handsaw of appropriate size and design; or
- (b) a chain-saw which is sufficiently powered, and equipped with a guide bar of sufficient length. The lightest possible saw and the shortest practicable guide bar provide a sound ergonomic combination.

381. Except for very small trees (for example less than 100 mm diameter) axes should not be used for felling, because the felling direction is difficult to control; furthermore, the workload and amount of timber wasted are much higher than when felling with a saw.

382. The following aid-tools should be available and may be used for felling:

- (a) a breaking bar or lever;
- (b) a small and a large alloy or plastic wedge;
- (c) a sledge or splitting hammer;

## Safety and health in forestry work

- (d) a turning hook or a turning strap;
  - (e) an axe (for clearing and debranching);
- optional:
- (f) a tree jack;
  - (g) a felling cushion; or
  - (h) other felling aids.

383. Iron wedges should not be used in any case.

384. Specially designed spades should be used for manual debarking, as they reduce the workload considerably compared to a machete or other tool not designed for this purpose.

385. All tools should be designed, manufactured and maintained according to the provisions in Chapter 6.

386. Cutting edges should be maintained in good working condition, and kept sharp and safe at all times.

387. Chain-saws should be designed and equipped in accordance with the following provisions; i.e., as illustrated in figure 4, they should incorporate:

- (a) separate handles for both hands when wearing gloves;
- (b) an on/off switch which is reachable with the right hand on the throttle and wearing gloves;
- (c) a throttle control lock-out which prevents the chain-saw from being started unexpectedly, because two levers have to be pressed simultaneously;
- (d) a rear handle guard for protection of the right hand;
- (e) an anti-vibration system, consisting of rubber shock absorbers between the engine block and handles;
- (f) a chain brake, which is activated manually by the front handle guard and by means of a non-manual mechanism in the case of kick-back;
- (g) a chain catcher;
- (h) a spiked bumper, which allows the weight of the saw to rest on the log securely during crosscutting;
- (i) a front handle guard for protection of the left hand from the chain;
- (j) a chain guard for avoiding injuries during transport.

388. Workers should be provided with and use personal protective equipment according to the provisions in Chapter 7.

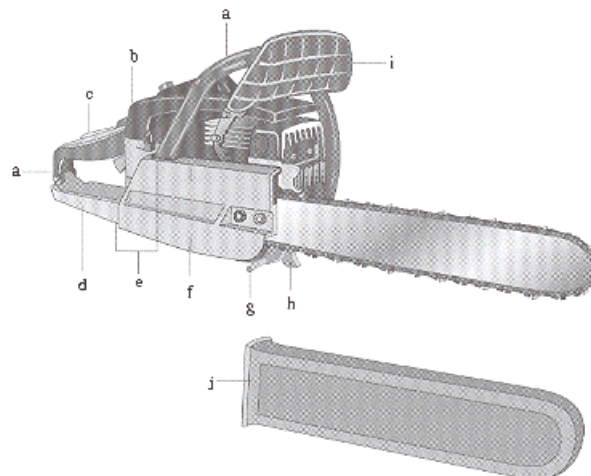
### *Operating a chain-saw*

389. Workers who are assigned to chain-saw operations should demonstrate their knowledge about and skills in:

- (a) mandatory safety features on chain-saws;
- (b) mandatory personal protective equipment;
- (c) maintenance of motor, chain and guiding bar of the chain-saw;

- (d) felling and cutting techniques according to the technical guidelines described in the following paragraphs of this code;
- (e) basic first aid in the event of an accident of a fellow worker.

Figure 4. Safety devices on chain-saws



Note: See paragraph 387 for a detailed key to this illustration.

Source: Based upon an illustration provided by the Bundesverband der Unfallversicherungsträger der öffentlichen Hand e.V. (BAGUV), Munich.

390. To reduce the health hazards arising from chain-saw operations, such as exhaust gases, noise and vibration, the duration of chain-saw work should be minimized as far as practicable by rotation with other tasks which do not require the chain-saw; these might include: sorting end products, scaling, machine operating, chokering and involvement in the planning and control of the operation. Operators should preferably not work with a chain-saw under load for more than five hours per day.

(Note: This limit is usually achieved by a combination of refuelling, maintenance, other work and rest periods unless excessive overtime is undertaken.)

391. Chain-saw operators should be provided with and use the personal protective equipment according to the provisions in Chapter 7.

392. The lightest saw and the shortest guide bar possible should be used.

393. Chain-saws should always be kept in a clean condition and effective working order.

394. The carburettor should be adjusted in a way that the chain is stationary when the engine is idling.

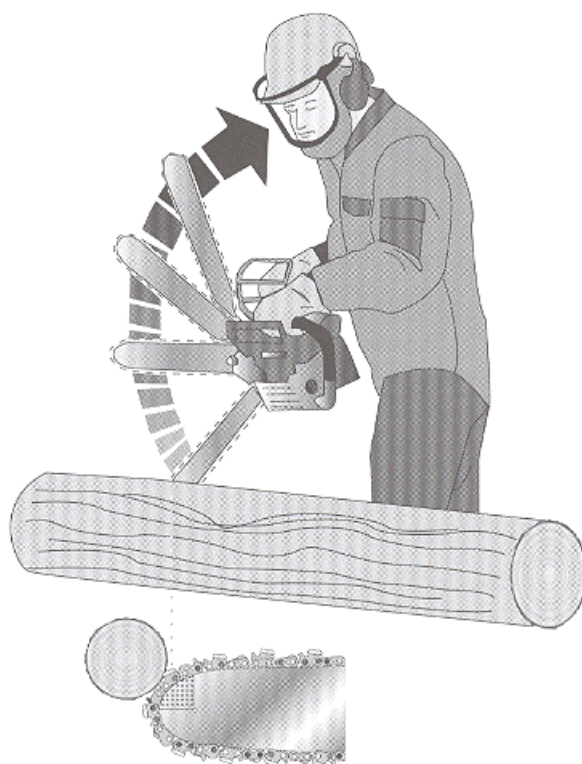
## Safety and health in forestry work

395. The functioning of the chain brake should be tested regularly.

396. When starting the chain-saw, a safe distance from other persons must be maintained. It should be ensured that the saw chain is clear of obstructions; the saw should be placed on the ground and secured with a foot on the base of the rear handle, or the rear handle should be gripped firmly between the thighs. Another method may be used, if it has been assessed as safe by a competent authority or training institution.

397. When working with the saw, a firm stance and a close hold of the saw to the body should be kept. Cutting with the tip of the saw should be avoided, as this can cause kick-back [→glossary], as shown in figure 5. Kick-back is very difficult to control and very hazardous.

Figure 5. Chain-saw kick-back



Note: Kick-back is caused by the upper tip of the guide bar being intercepted or accelerated by a stem, branch or other object.

Source: *ILO: Encyclopaedia of Occupational Health and Safety* (Geneva, ILO, 1998), Vol. III, p. 68.8.

398. Chain-saws should not be operated above shoulder height because of the risk of kick-back and the resultant backward rotation of the guide bar.

399. Chain-saws should always be switched off or the chain brake engaged when moving about.

400. When fuelling a chain-saw, a safe distance from all sources of ignition should be maintained. Smoking when fuelling should be strictly prohibited. Containers should be clearly labelled and have securely fitting caps. Plastic containers must be designed and approved for use with petroleum spirit.

401. Nobody should ever work with a chain-saw alone unless the requirements of paragraph 261 are met.

### *Operation*

402. Felling operations should only be carried out in daylight hours or with adequate lighting and in weather conditions which allow good visibility. When the wind is too strong to allow safe directional felling, felling operations should not be undertaken.

403. On steep, icy slopes, felling operations should only be undertaken when a safe stance can be maintained.

404. When carrying out felling operations in old growth or natural forests, particular attention should be paid to intertwining branches, climbers and dead trees.

405. Only those persons who have duties associated with felling, conversion or debranching activities should enter the work area. Before entering the work area, any other person should make their intention known to the operatives and receive an assurance that conditions are safe for entry.

406. Workers should be encouraged to ask for help if they do not feel competent to cope with specific felling difficulties.

407. When starting to fell a tree, workers should ensure that nobody who is not actually involved in the felling is in the felling area. The safety distance is at least twice the height of the tree being felled.

408. Escape routes should be chosen in advance and kept clear of brush, tools and other obstructions that would impede a quick escape.

409. The base of the tree should be free from obstacles, and fellers should assure that they are able to maintain a balanced stance.

410. The main felling cut should be made at a sufficient height above the highest ground level to enable the worker to make the cut safely, control the felling direction and have freedom of movement to step away from the stump when the tree starts falling. Generally, trees should be felled as close to the ground as the conditions permit.

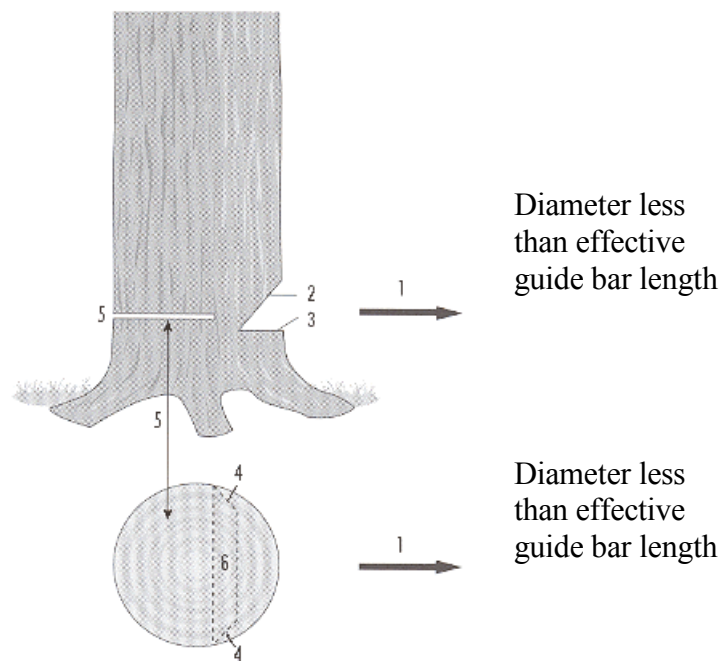
411. Any felling technique that has been assessed as safe by a competent authority or training institution may be used. Where no technique has been assessed as safe or in addition to these, the recommended technique for felling trees with a

## Safety and health in forestry work

butt diameter which is less than twice the effective guide bar length is as follows (see figure 6):

- (a) Reduce buttresses as necessary, to achieve a more or less cylindric tree-base to facilitate directional felling.
- (b) Cut a front notch, at a  $90^\circ$  angle to the direction of fall and having a depth of one-fifth to one-quarter of the butt diameter; the top and bottom cuts of the notch should meet exactly. Any over-cutting could weaken the hinge.
- (c) Make the main felling cut, which should be slightly higher than the notch and leave a hinge of about one-tenth of the butt diameter. This hinge is essential to guide the tree in the planned direction of fall.

Figure 6a. Standard technique for tree felling

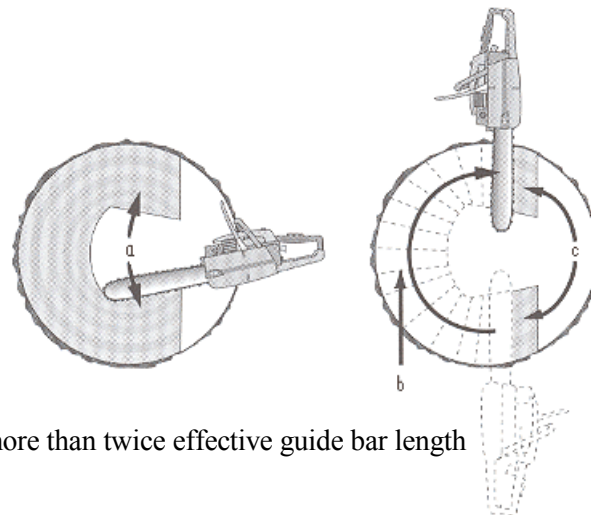


- Sequence of cuts:
- ① Felling direction
  - ② Top scarf cut
  - ③ Bottom scarf cut (width approx.  $45^\circ$ ; depth  $1/5-1/4$  of stem diameter)
  - ④ Small, lateral cuts (to prevent tearing out of fibre in softwoods)
  - ⑤ Main felling cut or back cut (slightly higher than bottom of scarf)
  - ⑥ Leave enough wood as a hinge

Source: ILO: *Encyclopaedia of Occupational Health and Safety* (Geneva, ILO, 1998), Vol. III, p. 68.8.



Figure 6b. Standard technique for tree felling



- (a) After a normal felling scarf has been made, the core of the tree is taken out with a boring cut – boring should start with the lower side of the guide bar to prevent kick-back;
- (b) the back cut should be at least 10-20 cm above the bottom level of the front scarf; it should leave –
- (c) a hinge at least 5 cm thick on either side.

Source: Draft *Code of practice on safety and health in forest work* (Geneva, ILO, 1997), p. 45.

412. When felling large trees, wedges or a breaking bar should be inserted into the back cut to prevent the tree settling back and jamming or trapping the saw; this will also help to push the tree in the designated felling direction.

413. When the back cut is deep enough to allow the tree to fall, the tree should be brought to fall using a lever or a wedge. The tree should not be completely severed, in order to preserve the hinge and so keep control over the planned felling direction.

414. The standard technique should be modified if the trees:

- (a) have a one-sided crown or a significant lean;
- (b) are leaning in a direction opposite to that chosen for felling;
- (c) have a diameter with more than twice the effective length of the guide;
- (d) are systematically to be brought down with winch support;
- (e) are dead or have symptoms of rot.

## **Safety and health in forestry work**

In these cases, an appropriate modified felling technique should be used, adapting the depth of the notch, the shape of the hinge and the use of wedges according to the specific requirements.

415. When a metal lever is used in motor-manual felling, workers should make the felling cut so that the saw chain cannot touch the lever.

416. When the tree starts falling, the adjacent canopy should be watched carefully for branches or treetops which might be released from either the falling or neighbouring trees. Particular attention should be paid in dense stands and in natural or virgin forest, where intertwining branches, climbers or unstable trees could increase this hazard.

417. All trees on which felling has started should be brought down safely before any further work is undertaken. If this is not possible, then the location and position of the "cut-up" or "hung-up" tree must be brought to the attention of all persons who may come into the danger area.

418. If a cut-up or hung-up tree cannot be brought down, for example because assistance is not available, the risk zone under and around the tree should be clearly marked and all personnel should be excluded from the risk zone until the tree has been brought down safely.

419. Particular care should be taken in felling dead trees and in working around them. Stump height should allow maximum visibility and freedom of activity during felling. Whenever possible, dead trees should be felled in the direction of lean, using as deep a notch as necessary, to minimize the use of wedges and the consequential shock vibration.

### **Taking down cut-up or hung-up trees**

420. Cut-up and hung-up trees are a potentially fatal hazard, and should be taken down immediately using an authorized method.

421. When taking down hung-up trees, workers should strictly observe the following. They should not (as indicated in figure 7):

- (a) work under the hung-up tree;
- (b) fell the holding tree;
- (c) climb the hung-up tree;
- (d) cut lengths from the butt of the hung-up tree except for small timber with less than 20 cm base diameter;
- (e) fell another tree onto the hung-up tree.

Failure to comply is extremely dangerous, as it increases the risk of serious injury.

Figure 7a. Prohibited practices for taking down hung-up trees

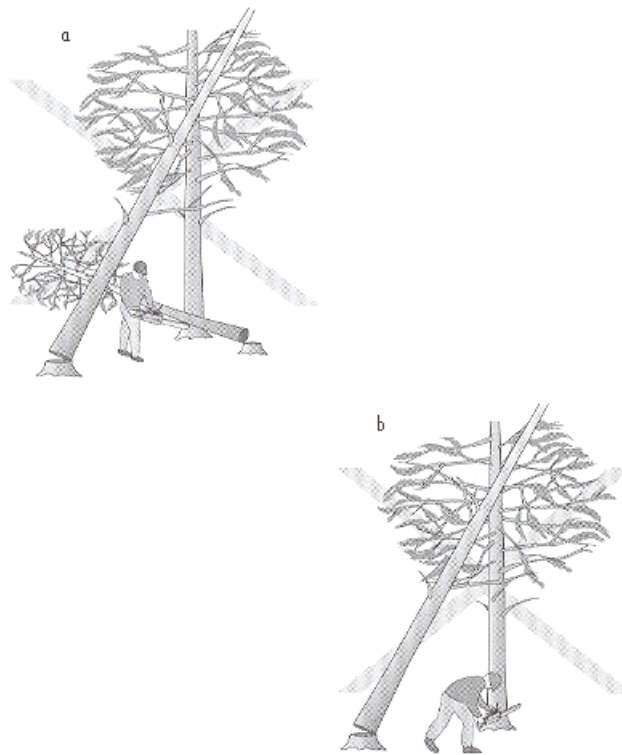
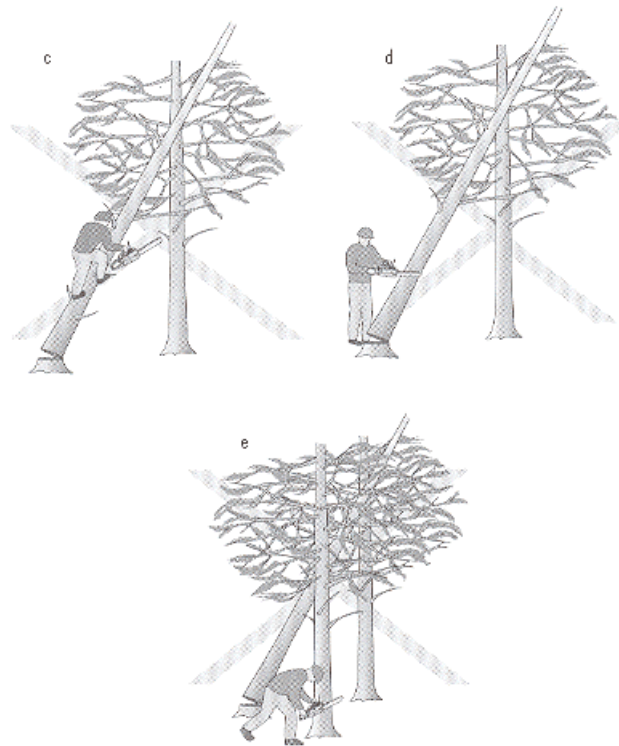


Figure 7b. Prohibited practices for taking down hung-up trees

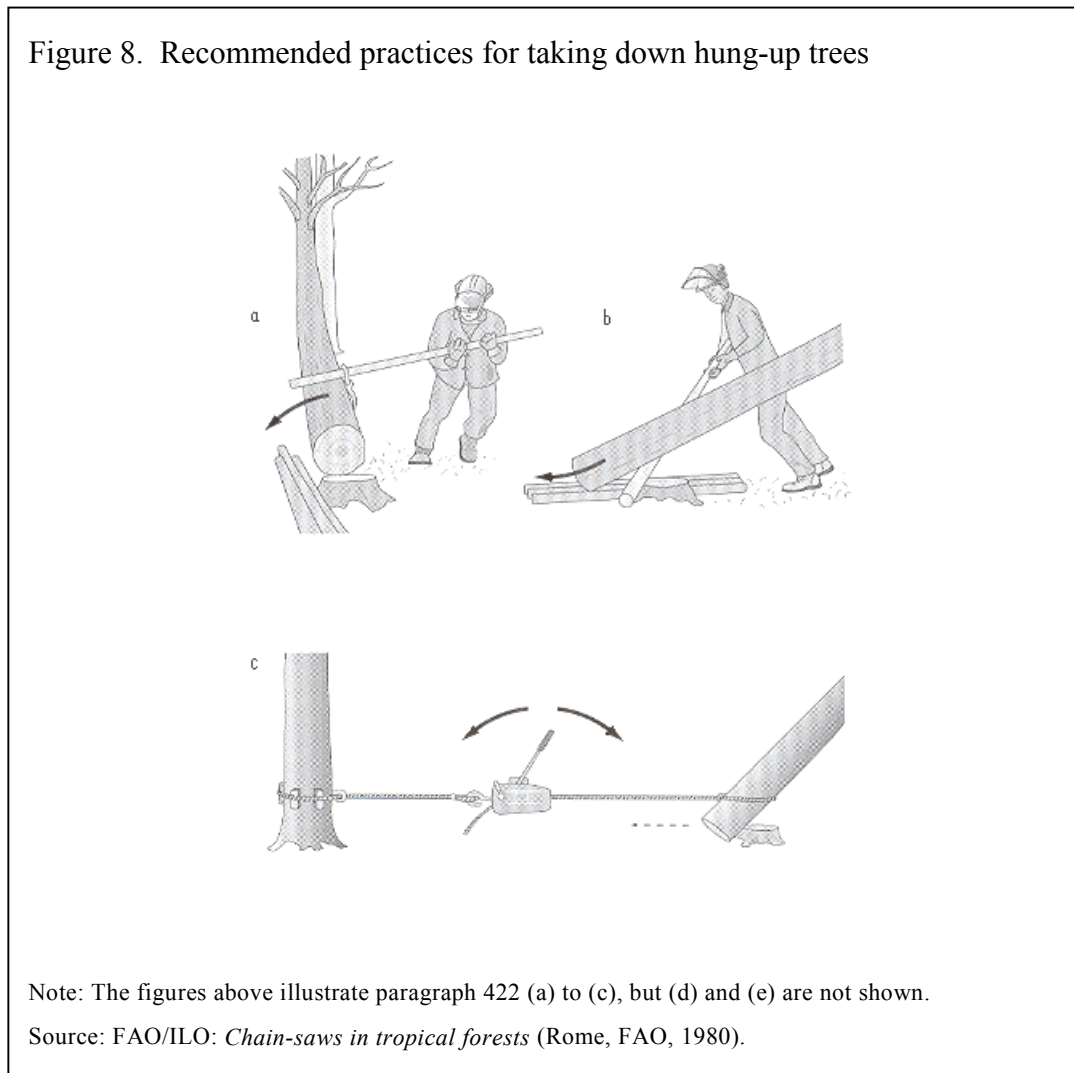


Source: Illustrations based upon "Takedown of hung-up trees", in Forestry and Arboriculture Safety and Training Council, 1996.

422. For the safe treatment of hung-up trees, one of the following methods (see figure 8) should be used:

- (a) cutting the hinge unequally so as to leave a pivot, then rolling the tree using a turning hook or cable of sufficient size and strength to release the crown from the holding tree, enabling it to slide down the stem of the holding tree;
  - (b) levering the hung-up tree away from the direction of lean, using a sufficiently strong pole or a sulky until the tree falls to the ground;
- (Note: methods (a) and (b) may require help from a fellow worker.)
- (c) as for (b) but using a hand winch;

- (d) using a skidder or other mechanical winch to pull the cut-up or hung-up tree down. When this sort of assistance is available, it is the safest option;
- (e) where the use of a skidder or mechanical means is not available to bring down a cut-up tree, then a competent person should supervise the felling of that tree using an approved felling practice.



### Manual and chain-saw debranching

423. Workers should ensure that trees are in a stable position before any debranching commences.

424. When trees have been felled across a slope, the lower side branches should be removed first to ensure that most of the debranching can be done from the relative safety of the upper side.

425. Workers should adopt a secure and balanced stance.

## **Safety and health in forestry work**

426. When debranching using an axe, workers should maintain a safe stance and ensure that the stem is between their body and the branch being cut. On sloping ground, manual debranching is less tiring.

427. When debranching using a chain-saw, workers should:

- (a) keep the saw close to the body and support the weight of the saw on the tree or the right thigh;
- (b) not walk when debranching the near side of the stem;
- (c) keep the right foot well away from the chain when debranching the far side of the stem;
- (d) beware of branches and undergrowth under tension, and watch out for spring back;
- (e) not cut branches with the tip of the bar (risk of "kick-back", ➡ glossary);
- (f) not allow the tip of the bar to contact uncut branches, supporting logs, butt ends or other obstacles (risk of kick-back);
- (g) maintain a firm grip on both handles of the saw whenever the chain is moving;
- (h) not reach across the guide bar in order to move a loose branch.

## **Manual and chain-saw crosscutting**

428. Workers should carefully examine a log before crosscutting, to determine which way it will roll, drop or swing when the cut is completed.

429. Workers should not work on the downhill side of the log being crosscut unless this is unavoidable; in this case the log must be blocked or otherwise secured to prevent rolling.

430. On sloping ground, logs should be completely crosscut. If it becomes dangerous to complete a cut, the log should be marked as a hazard using clear and unmistakable signs.

431. Whenever it seems likely that the guide bar will become jammed before the cut is complete, the notch should be kept open by the use of a wedge.

432. Logs under tension should be crosscut by making the first cut into the compression zone (see figure 9).

433. Cuts should be made from whichever side of the stem will not spring towards the operator when the log is severed.

## **Mechanized felling and conversion**

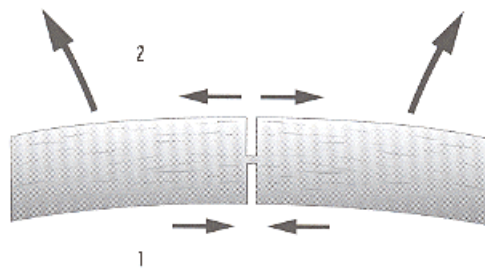
### *Organization*

434. Skid trails and tracks over which harvesting machines will travel should be thoroughly planned and should be marked with unmistakable signs before mechanized harvesting operations are started.

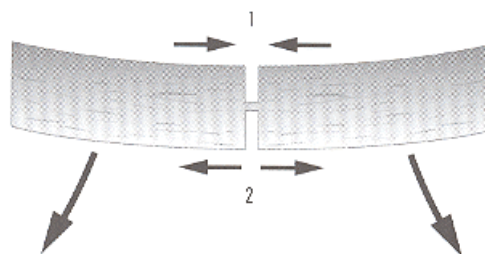
435. Mechanized felling should be planned in such a manner as to avoid endangering other persons in the working area.

Figure 9a. Crosscutting wood under tension

As a general rule for wood under tension, as illustrated below, the first cut is into ① the compression zone, and the second is into ② the tension zone.

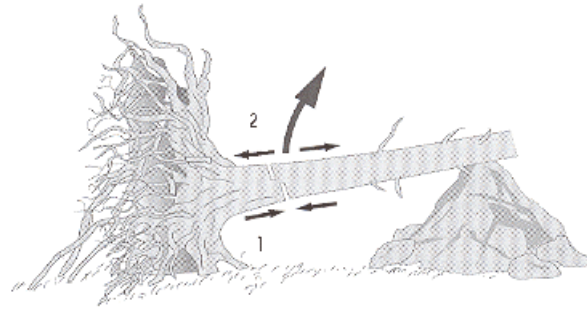


Tension on the upper side: the stem springs upwards

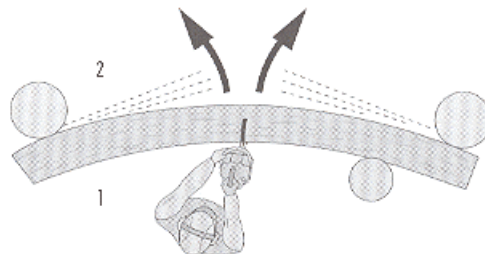


Tension on the lower side: the stem springs downwards

Figure 9b. Crosscutting wood under tension



Big stems = big tension: second cut placed slightly to the side of the first one



Lateral tension: operator always remains on the compression side

Source: Based on illustrations provided by the Bundesverband der Unfallversicherungsträger der öffentlichen Hand e.V. (BAGUV), Munich.



436. Mechanized harvesting should not be carried out in site conditions where the stability of the machine cannot be assured. Equipment should not be operated on slopes exceeding the maximum gradient specified by the manufacturer or exceeding that which has been assessed as safe by a competent authority or a competent person. Where the above specifications have not been made:

- (a) a rubber-tyred skidder or forwarder should not be operated on a slope which exceeds 35 per cent;
- (b) a crawler tractor, feller buncher, excavator harvester or similar machine should not be operated on a slope which exceeds 40 per cent; and
- (c) any other forestry equipment specifically designed for use on steep slopes should not be operated on a slope which exceeds 50 per cent.

437. In order to minimize musculo-skeletal disorders and mental stress in machine operators, creative work organization, which may include job rotation and suitable shift schedules, should be encouraged.

### *Equipment*

438. Machines used for mechanized felling should be designed and equipped according to the provisions in Chapter 6.

439. The machines should be designed and equipped to provide control over the direction of fall of the tree.

440. The danger zone specified by the manufacturer should be clearly marked on the machine in a position visible to any observers or bystanders.

441. Operators should use safety footwear which provides a good grip on the prevailing ground conditions. For work other than operating the machine, operators should use the personal protective equipment in accordance with the provisions in Chapter 7.

442. When noise inside the cab of the machine exceeds a level of 85 dB(A), operators should wear suitable hearing protection.

443. For working in poor light conditions, adequate lighting should be fitted on the machine.

444. Machines should be equipped with communication devices such as two-way radios or mobile telephones.

445. Tracks or chains should be fitted to the machine whenever the ground conditions hamper machine traction or stability.

### *Operation*

446. Operators should inspect cutting equipment for signs of excessive wear or damage at least once a day, and ensure that all parts of the cutting equipment are properly aligned.

## **Safety and health in forestry work**

447. Saw chains including depth regulators should be sharpened and maintained according to the manufacturer's recommendations.

448. The machine should be operated using the techniques and within the limits specified by the manufacturer.

449. Driving and operating on side slopes should be avoided whenever practicable.

450. The machine should not be destabilized by overloading.

451. When manoeuvring the machine, the operator should ensure that the grapple, harvesting and processing unit are in the correct working position.

452. Work should be stopped immediately when any person enters the risk zone specified for the machine or comes closer than two tree lengths plus the length of the boom, whichever is greater (for example, tree length x 2 = 28 m + 7 m boom = 35 m).

453. Anybody approaching a machine should do so in full view of the operator. Nobody should approach the danger zone before being invited by the operator.

454. Processed material should be left in a safe and stable position with safe access for extraction machinery.

455. The machine should be parked on level ground; with the transmission placed in the park position specified by the manufacturer; if possible with the parking brakes or brake locks applied; and with the wheels chocked if necessary.

456. When parking the machine the operator should ensure that:

- (a) hydraulic equipment is left in lowered position;
- (b) hydraulic pressure is de-activated where this is possible;
- (c) saw teeth are in guarded position and knives closed.

## **Extraction**

### **General provisions**

457. Specific local conditions require different extraction methods. Means of extraction should be selected after taking the following factors into account:

- (a) topography of the land;
- (b) structure and type of soil;
- (c) forest cover types;
- (d) kind of silvicultural treatment, e.g. clear-cutting or selective thinning;
- (e) harvesting method, whether pole length, shortwood or whole tree system;
- (f) presence of streams or wetlands;
- (g) presence of protected or environmentally sensitive areas;
- (h) existing and required infrastructure.

458. Soil disturbance and damage to the remaining crop should be minimized as far as practicable, by using an appropriate extraction method.

459. Extraction routes suitable for the extraction method and direction should be planned prior to the operation and clearly marked in the working area.

460. Generally, logs should be prepared prior to extraction operations by cutting them into the designated specification, to control the weight of the load and minimize damage to remaining trees.

461. Where a quick extraction cycle is required, individual loads should be prepared by setting chokers to the individual logs well ahead of the arrival of the extraction vehicle, aircraft or other means.

462. For safety and environmental reasons, extraction operations should be suspended during inclement weather.

### **Manual extraction**

#### *Organization*

463. Lifting and carrying wood manually should be avoided whenever possible. Where it cannot be avoided, transport distances should be kept as short as possible by using an appropriate felling direction and a sufficiently close network of extraction routes.

464. Weights should be reduced wherever possible by splitting or crosscutting prior to manual carrying, according to the assortments required.

465. Provision should be made for adequate rest periods at regular intervals.

#### *Equipment*

466. Manual handling of timber should not be done without the use of aid tools such as hooks, tongs or sannies.

467. Sulkies or similar equipment should be used, where practicable, to minimize the workload in manual handling.

468. Personal protective equipment should be provided and worn in accordance with the provisions in Chapter 7.

#### *Operation*

469. Where not specified otherwise in national laws and regulations, the weight of timber which has to be handled manually by one worker should not exceed a level likely to jeopardize health or safety, in accordance with the ILO's Maximum Weight Convention, 1967 (No. 127), and Recommendation (No. 128).

470. Workers should keep their backs straight and use their leg muscles when lifting. Loads should be kept close to the body and be well balanced. Workers should select their path carefully and avoid obstacles.

471. If logs are carried by more than one person, the rearmost worker should give the commands for lifting and dropping. All workers should be on the same side of the log. When slopes are crossed the workers should be on the uphill side.

## **Safety and health in forestry work**

472. Rolling or sliding timber downhill should only be done when the down slope area is completely clear of other persons.

### **Extraction by chute**

#### *Organization and equipment*

473. Chutes should be designed and installed in such a way that logs cannot jump out of the chute.

474. Gradients should be as close as possible to the minimum required for gravity transport (for example variable gradients). In difficult terrain, closed "full pipe" chutes are preferable to open chutes.

475. In steep terrain, appropriate braking devices should be installed in the chute.

476. Personal protective equipment should be provided and worn in accordance with the provisions in Chapter 7.

#### *Operation*

477. Personnel must stay well clear of the chute while it is in operation.

478. Only one log at a time should be transported in a chute, except shortwood with a length of less than 3 m.

479. If the landing area cannot be seen from the loading area, no log should be sent down until a signal to do so has been received from the landing.

480. Those giving signals should always be in a safe place, if possible behind trees which will provide protection if a log jumps out of the chute.

481. No log should be left lying in the chute. At the landing, the wood should be stacked on sites that cannot be struck by logs coming down the chute.

### **Extraction with draught animals**

#### *Organization*

482. Extraction with draught animals should be considered suitable only for short distances (typically 200 m or less) and relatively gentle slopes (in general not more than 20-30 per cent when skidding downhill and not more than 10-15 per cent uphill).

483. Only animals with sufficient strength and endurance to cope with the strain of extraction work should be used.

484. The animals should be fed, watered and rested according to their physical needs. Only persons who are familiar with the animals' needs and behaviour should work with them.

485. Undergrowth on animal trails should be cut as close to the ground as practicable, and obstacles should be carefully removed.

486. Extraction should be synchronized with cutting as much as possible, and commence at the furthest point of the extraction route to avoid having to travel over branches, tops and other debris.

*Equipment*

487. Suitable harnesses should be used to avoid injury and reduce physical strain on the animals when they are pulling the load.

488. Skidding pans, sledges or sulkies should be used to reduce friction between the load and the ground.

489. Persons guiding animals should be provided with and wear protective equipment in accordance with the provisions in Chapter 7.

*Operation*

490. Persons guiding animals should always walk beside the animal or behind the load when long reins are used.

491. A safety distance of at least 5 m should be maintained between the front of the load and the animal.

**Extraction by skidder and winch**

*Organization*

492. Slopes should not exceed those gradients specified in paragraph 436 in ground skidding operations. Although modern skidding machines are capable of operating on slopes steeper than those indicated, doing so greatly increases accident risks and soil disturbance, reduces operational effectiveness and leads to faster depreciation of the machine.

493. Uphill skidding should be preferred to downhill skidding because it:
- (a) allows pulling the winch line downhill, which puts much less strain on the operator than pulling it uphill;
  - (b) gives better control over the movements of the log;
  - (c) tends to disperse run-off water into the surrounding area and not onto the landing area.

494. A system of designated skid trails should be used. Skidders should remain on these designated skid trails at all times and the poles hauled to the trail by means of the winch.

495. Skid trails should:
- (a) be marked clearly;
  - (b) be as straight as possible;
  - (c) on slopes be run at a slight angle across the slope rather than straight up and down;

## **Safety and health in forestry work**

(d) be clear of any obstacles which might impede the operation or cause skidder instability.

496. Stumps on skid trails should be cut as close to the ground as practicable.

497. The skid trail width should be the minimum practicable to allow the skidder to travel safely without damaging remaining trees alongside the trail. Where necessary, for example in dense crops, an adequate number of turning places must be planned.

498. Skid trails should not cross streams or gullies unless it is absolutely unavoidable. In this case, the stream bed should be protected, for example with a culvert, logs or rocks. These should be removed when no longer needed.

499. Along the entire length of a skid trail, work should only be permitted if a safe distance from the trail is maintained. This distance should exceed the total length of the skidder plus the load unless protection is equally provided by standing trees.

500. Unmistakable signals should be agreed upon and used among the members of a skidding crew.

### *Equipment*

501. Skidders should be sufficiently powered and of appropriate size for the dimension and weight of the load to be extracted.

502. They should be equipped:

- (a) in accordance with the requirements in Chapter 6;
- (b) preferably with high-flotation tyres;
- (c) with a loading shield and butt plate;
- (d) with an underbody protective plate;
- (e) with a powered winch with at least 30 m of wire rope having a breaking strain of at least twice the pulling capacity of the winch; and
- (f) with an arch or other support which will suspend the front end of the load to prevent logs from digging into the ground as they are being skidded.

503. Farm tractors not equipped in accordance with the provisions in Chapter 6 should not be used for timber extraction.

504. Radio-controlled winches should be used if available, because this makes it easier to maintain a safe distance from load and rope.

505. Cables used on skidder-mounted winches should be:

- (a) of sufficient size and strength and comply to the winch manufacturer's specifications;
- (b) securely fixed on the drum;
- (c) neatly and tightly wound on the drum.

506. Cables, pulleys and chokering equipment should be inspected regularly for damage and signs of wear. Broken or badly frayed cables should be repaired

by splicing or be replaced. For fitting, the securing device or method specified by the manufacturer should be used.

507. Skidding crews should be provided with and wear personal protective equipment in accordance with the provisions in Chapter 7 of this code.

(*Note:* When handling steel cables, gloves with a heavy-duty palm are necessary.)

### *Operation*

508. Skidding should not begin before the area is abandoned by workers not engaged in the operation.

509. When getting in and out of the cab, the skidder operator should always face the cab.

510. Skidding across slopes should be avoided, due to the significant decrease in skidder stability.

511. The rear of the skidder should be positioned facing the load. Excessive side hauling should be avoided.

512. Skidders should be securely braked, and stabilizers and butt plates left in the lowered position when the winch is operating.

513. When chokers are set or removed, it should be ensured that the pole will not roll.

514. Choker cables, chains or tongs should be placed securely and fairly close to the end of the pole, keeping the shortest practicable length between the pole and the winch line.

515. A minimum of three turns of cable should always be left on the drum when pulling out the cable. In practice this means that the maximum hauling distance will not exceed 25 m when using a 30 m cable.

516. The winch loading should be well within the pulling power of the winch and the breaking strain of the cable.

517. The load should be winched close to the butt plate.

518. Walking alongside the load should be avoided.

519. On slopes, workers should always be on the uphill side of the load.

520. When logs are skidded around bends, any worker present should stand on the inside of the curve or preferably use the protection of standing trees.

521. No person should sit or stand on the moving load or attempt to reposition it physically.

### **Extraction by forwarder**

#### *Organization*

522. Logs extracted by forwarders should be relatively uniform in length.

## **Safety and health in forestry work**

523. The operation of forwarders should in general be restricted to slopes not exceeding a gradient of 35 per cent.

### *Equipment*

524. Forwarders should be equipped according to the requirements specified in Chapter 6.

525. The safe working load and reach of the crane should be clearly marked on the main boom.

526. Tracks or chains should be fitted according to the ground-bearing capacity and condition.

### *Operation*

527. The grapple should not be operated if any part of the machine comes within 15 m of overhead electric lines suspended from steel towers, or 9 m in the case of wooden poles.

528. Work should be stopped if anyone comes within a distance equal to twice the reach of the loader.

529. Grapples should be parked correctly before driving the forwarder.

530. The stability of the machine should always be maintained, by operating only under conditions which are within its technical capacity.

531. Excessive side slopes should be avoided. Where work has to be undertaken in severe side slope conditions, the boom should be extended on the high side to increase stability. Turning uphill on side slopes should be avoided.

532. The loader or carrier should not be overloaded or loaded above the level of the headboard or the stanchions.

533. When ground conditions are severe, the load should be reduced accordingly.

534. When loading and unloading, the parking or loading brake must be applied.

535. When loading on sloping ground, the machine should be parked straight up or down the slope. Any convenient stumps or other obstructions should be used to chock the wheels.

536. The load should be fully encircled when the jaws are closed.

537. Before driving down steep slopes, the brakes should be checked and the low gear and differential lock engaged.

538. When the machine is not operating, brakes should be applied and all hydraulic equipment should be parked in lowered position.



## Extraction by cable crane

### *Organization*

539. Cable lines, spar and anchor trees (➡) should be planned well in advance of the felling and extraction operation and clearly marked in the working area.

540. Cable cranes should be installed and operated only by experienced workers, who are in possession of the relevant skills certificate.

541. Spar and anchor trees (➡) should only be climbed by trained experienced climbers [➡Chapter 15, tree-climbing].

542. Spars and support trees should be examined carefully for defects before being selected. They should be sound, straight, green and of sufficient diameter to withstand the strains to be imposed.

543. The tower of a mobile cable crane should be anchored securely by at least two ropes secured as far back as possible, in accordance with the manufacturer's recommendations.

544. Anchor (➡) ropes should have a minimum angle of 45° from the vertical at the tower and spar trees, whenever possible.

545. Trees and stumps used for anchors (➡) should be free of rot, secure and of sufficient size. Stumps should be notched to provide a secure hold for the stop.

546. A high degree of cooperation between workers is essential in cable crane operations.

547. Clear and unmistakable communication signals should be agreed upon and used among the members of a cable crane crew.

### *Equipment*

548. The cable crane system should be equipped with cables and components complying with the manufacturer's recommended specifications, and must be in serviceable condition. All blocks, hooks and shackles should be clearly marked with the safe working load.

549. Two-way radios should be used for communication among a cable crane crew, whenever practicable. If there is radio interference, the operation should cease, unless other effective means of communication are in place.

550. Workers operating in cable system operations should be provided with and wear personal protective equipment in accordance with the provisions in Chapter 7.

### *Operation*

551. The weight of the load should not exceed the manufacturer's recommended safe working load, which must be clearly stated on the machine.

552. No other operation should be carried out within a distance of 20 m of the system while the winch ropes are in motion.

## **Safety and health in forestry work**

553. During high-lead hauling, it is essential that nobody is endangered by the suspended load.

554. Anchor (➡) ropes must be kept tight and secure at all times.

555. Ropes should be securely fastened to winding drums and at least three turns of rope should remain on the drum when operating.

556. Broken or significantly damaged ropes should be repaired by splicing immediately. The splice should be as long in metres as the diameter of the rope in millimetres, i.e. a 9 mm rope requires a splicing of 4.5 m on each side of the join.

557. Damaged or broken anchor ropes (➡) should be discarded.

558. The winch operator should work only on recognized signals.

559. The winch operator should obey the "stop" signal immediately. Any unidentifiable signal should be interpreted as a "stop".

560. The working area around the winch should be kept clear of any obstacles.

561. Side hauling should be done at the minimum engine speed practicable.

562. The operator should not work within the bight of hauling ropes.

563. Choker setters should:

- (a) keep at least 2 m in thinning and an appropriately greater distance in clear fell from either side of the cableway when the cables are in motion;
- (b) position themselves behind the load or behind standing trees during side hauling;
- (c) not attempt to free any obstructed load when the hauling ropes are under tension.

564. No person should ride on high-lead haulage systems.

565. During stormy weather the operation should be stopped.

566. During a thunderstorm, work should be stopped and workers should move well away from the installation because of the risk of lightning.

## **Extraction by helicopter**

### *Organization*

567. Before starting work, the pilot and helicopter ground staff should hold a safety briefing with all members of the operation crew to make them aware of the hazards inherent in helicopter operations.

568. Because the productivity of helicopter extraction is so high, cutting operations tend to involve large numbers of workers who would be at risk during the extraction phase. Felling and conversion should therefore be undertaken well in advance of the extraction operation to reduce these risks.

569. If felling and other work proceed during helicopter extraction, flight routes must be established and observed so that workers are not in danger from dropped or aborted loads.

570. Landing areas should be planned and prepared to provide enough space for the safe dropping of timber and adequate room for workers releasing chokers from stacked logs. These preparations should also allow all personnel to stay well clear of the drop zone when the helicopter is delivering the load.

571. In addition to the landing, one or more graded areas should be prepared as landing pads for periodic refuelling and maintenance of the helicopter. Vegetation should be cleared away from these areas to permit adequate clearance for the helicopter's rotor blades during landing and take-off. The location should facilitate an emergency landing of the helicopter if required. The refuelling pad should be placed sufficiently far away from the log landing that it will not cause any hazard to persons working on the landing.

572. Because of the quick turnaround rates of the helicopter, work should be organized so that loads are choked well before the arrival of the helicopter, following a pre-arranged transport pattern.

573. The safety of bystanders and visitors to the logging site should be considered, since these activities inevitably attract the attention of the public. In such circumstances, a designated visitor area providing a good view at a safe distance from the log landing and helicopter landing is a good arrangement.

574. All personnel engaged in helicopter extraction operations should be trained in radio communication and hand signals.

575. All personnel should be instructed and made aware of the risk zones around a landed or hovering helicopter, and they should know the procedures to be adopted when approaching a landed or hovering helicopter.

576. In the loading zone and at the landing, at least one member of the helicopter ground staff should be assigned to direct the pilot to the designated loading and dropping position, by radio and hand signals.

### *Equipment*

577. Helicopters used for extraction should be equipped with:

- (a) an emergency release hook;
- (b) a tether line of sufficient length according to the topography and the height of any tree above which the helicopter must hover;
- (c) a hook attached to the tether line which allows remote control release of the load on the landing.

578. Chokers should be of sufficient length to allow a secure attachment of the logs to the load hook. A sufficient number of chokers should be available.

579. All persons engaged in helicopter extraction should be provided with two-way radios.

## **Safety and health in forestry work**

580. All personnel engaged in helicopter operations working on the ground should be equipped with and wear personal protective equipment in accordance with the provisions in Chapter 7.

581. Signs, signals or other means of blocking the loading areas and landings, as well as public roads to unauthorized entry, should be available if required by the local conditions.

### *Operation*

582. The helicopter should not fly directly over workers or inhabited areas when carrying a load of logs or other suspended load.

583. Helicopter ground staff, forestry crews and pilots should keep in radio contact at all times.

584. Workers not visible from the air should report their location at regular intervals to the pilot or helicopter ground staff.

585. Pilots should follow the ground staff's commands when being directed to the loading and dropping zone by radio and/or hand signals.

586. All forestry personnel should strictly follow any instructions given by the pilot or helicopter ground staff at all times.

587. In particular, when entering, loading or unloading a landed or hovering helicopter, all personnel should follow strictly the pilot's instructions and be aware of the risk zone of moving rotor blades.

588. Chokers should be attached securely to the logs, ensuring that logs do not slip out of the choker and that chokers are positioned sufficiently far away from the point of balance of the load that it is suspended vertically when lifted.

589. During flying operations, no work should be carried out on the landing other than that which is strictly necessary, such as the release of chokers and safe placement of logs. When chokers cannot be released safely, they should be left in place.

590. During the approach, load dropping and departure of the helicopter to and from the landing, all work on the landing should be immediately stopped and all personnel should stand clear, preferably on the pilot's side of the helicopter.

591. During dry spells, the log landing area and helicopter refuelling and maintenance pads should be watered to reduce dust levels, which may impair visibility and interfere with the safe operation of the helicopter.

## **Landing and stacking**

### *Organization*

592. Piling and loading should be mechanized as far as practicable, to avoid heavy physical strain and the risk of accidents associated with manual handling.

593. Landing location and design as well as stacking places should be identified during harvesting planning.

594. Landings need to be well drained.

595. During prolonged dry weather, landings may need to be watered to reduce dust.

### *Equipment*

596. If mechanical loaders are used, they should be equipped in accordance with the provisions in Chapter 6.

597. Personal protective equipment in accordance with the provisions in Chapter 7 should be provided and worn.

### *Operation*

598. Landings should be kept as clear as possible.

599. Logs should be approached only after they have been completely landed and, if necessary, stabilized.

600. Produce should be stacked on firm, level ground or some other sound base.

601. Stacks should be made and maintained in a stable and secure condition. Stacking on top of steep roadside banks should be avoided.

602. Timber should not be stacked higher than necessary. Where there is additional manual handling, the height of stacked timber should not exceed the shoulder height of an average forest worker.

## **Loading and transport**

### **Loading**

603. Manual loading should be avoided; when it is unavoidable, however, hand winches or similar aids should be used to reduce physical strain.

604. Vehicles being loaded should be parked safely and braked securely.

605. No person should be in the cab or on the platform of the vehicle while loading is in progress, unless the cab of the vehicle is adequately protected.

606. Truck loads should be properly balanced and secured by binders that are of sufficient strength to prevent logs from becoming dislodged or shifting in transit.

607. Workers operating in loading and transport operations should be equipped with and wear personal protective equipment in accordance with the provisions in Chapter 7 of this code.

## Safety and health in forestry work

### Road transport

#### *Organization*

608. The gradient of roads should, wherever practicable, not exceed 10 per cent.

609. Roads that have to be used in wet weather conditions should be properly drained and constructed with a rock base and a surface of gravel or other durable material.

610. Forest roads and bridges should be maintained properly and in advance, to allow heavy vehicles to travel safely without causing damage to the road surface, which might result in erosion and give rise to costly repair.

611. All truck transport should be carried out in a manner that will minimize road damage. Transport operations should therefore be tailored to the bearing capacity of the road. Drivers should:

- (a) hold the legally required licence appropriate for the type of vehicle they are operating;
- (b) observe national traffic regulations at all times;
- (c) have a thorough knowledge of the regulations and instructions for operating the particular type of vehicle they are driving;
- (d) be able to carry out routine servicing and minor repairs;
- (e) have the final responsibility to ensure that the truck is loaded correctly and securely and that the truck is not overloaded. The latter is best ensured by weighing the truck. Where no weighing facilities exist, tables of volume-weight ratios for common species as well as operator experience should be used, with the necessary caution.

612. A daily, full inspection should be made of trucks and trailers, paying particular attention to the steering mechanism, lights and reflectors, brakes, boosters, brake hoses and connections, reaches, bunks, bunk blocks and couplings. Any defect which makes the vehicle unsafe to operate should be replaced or repaired before the vehicle is put back into service.

613. Wheels should be checked regularly for cracks, uneven tread and pressure of tyres, and loose or missing lug bolts.

#### *Equipment*

614. Timber trucks should be sturdy and reliable, able to operate on forest roads.

615. The trucks should be equipped and in a roadworthy condition, to comply with the requirements of national laws or regulations concerning road safety. This applies equally to timber trucks operating only on private forest roads.

616. To protect the cabin from falling objects or penetration by an unsecured load, timber trucks should incorporate an adequate barrier between the load and the cabin.

617. While operating frequently in remote areas, trucks should be equipped with two-way radios or mobile telephones.

618. A safe and adequate means of access to and egress from the loading workstation should be provided on self-loading trucks.

619. Working and walking surfaces on vehicles should be designed and constructed so as to eliminate slippery conditions.

*Operation*

620. Trucks should not approach a landing when there is danger from incoming produce.

621. Workers should keep well clear of swinging or falling logs and outside the risk zone in the event of a fractured cable.

622. Vehicles should not be overloaded. There must be strict adherence to traffic laws concerning maximum loads.

623. Riding on any part of a timber truck other than in the cab should be strictly prohibited.

**Water transport**

624. When water transport is used, special care should be taken when constructing and maintaining the area where the logs will be moved into the water or loaded onto the transport. The surface of the area should be constructed to the same standards as forest roads or landings.

625. Laws and regulations concerning safety of waterways should be strictly followed.

626. Manual handling should be avoided. If unavoidable, aid tools should be used for manoeuvring and placing such as sappies, timber-picks, hooks or thongs.

627. Timber rafts should be towed or pushed by boats with sufficient power to control the speed and direction of the raft in a safe manner.

628. Rafts should be securely bound using binders or chains of sufficient strength, in order to ensure the safety of other traffic using the waterway and to prevent the loss of timber. Flags and lights for night travel should be used to identify the front and rear of the raft clearly, in order to avoid collision.

## **15. High-risk operations**

### Tree climbing

#### **Organization**

629. A risk assessment should be carried out before starting work. The appropriate equipment and number of operators should be decided upon, and emergency procedures known and agreed by all staff.

630. Tree-climbing operations should be carried out by a team of at least two people. One of the ground staff should be competent in rescue techniques.

631. Climbers and ground staff should plan the job thoroughly and be aware of the nature of the task and associated hazards.

632. Ground staff should maintain effective communication with the climber.

633. Hot weather may cause heat stress in climbers and ground staff. Sufficient breaks should be allowed to minimize the risk of impaired judgement due to heat stress.

634. At no time should tree-climbing operations be done when visibility is seriously impaired or during inclement weather, such as storms or heavy rain, or when the tree is covered with ice.

#### **Personnel**

635. Trees should only be climbed by experienced and fully competent persons.

636. Workers employed in tree climbing operations should be in good physical condition.

637. Everyone engaged in tree climbing operations should be fully trained.

638. Climbers should have proper knowledge and training in:

- (a) safe climbing techniques;
- (b) tasks performed when climbing trees, such as rigging, pruning, tree topping or seed collection.

639. Climbing teams should be trained in basic first-aid techniques and carry a personal first-aid kit.

640. All climbers should understand and implement the manufacturer's maintenance recommendations for all climbing equipment such as:

- (a) safety harness;
- (b) safety belt;
- (c) climbing ropes and strops;
- (d) karabiners;
- (e) other climbing aids.

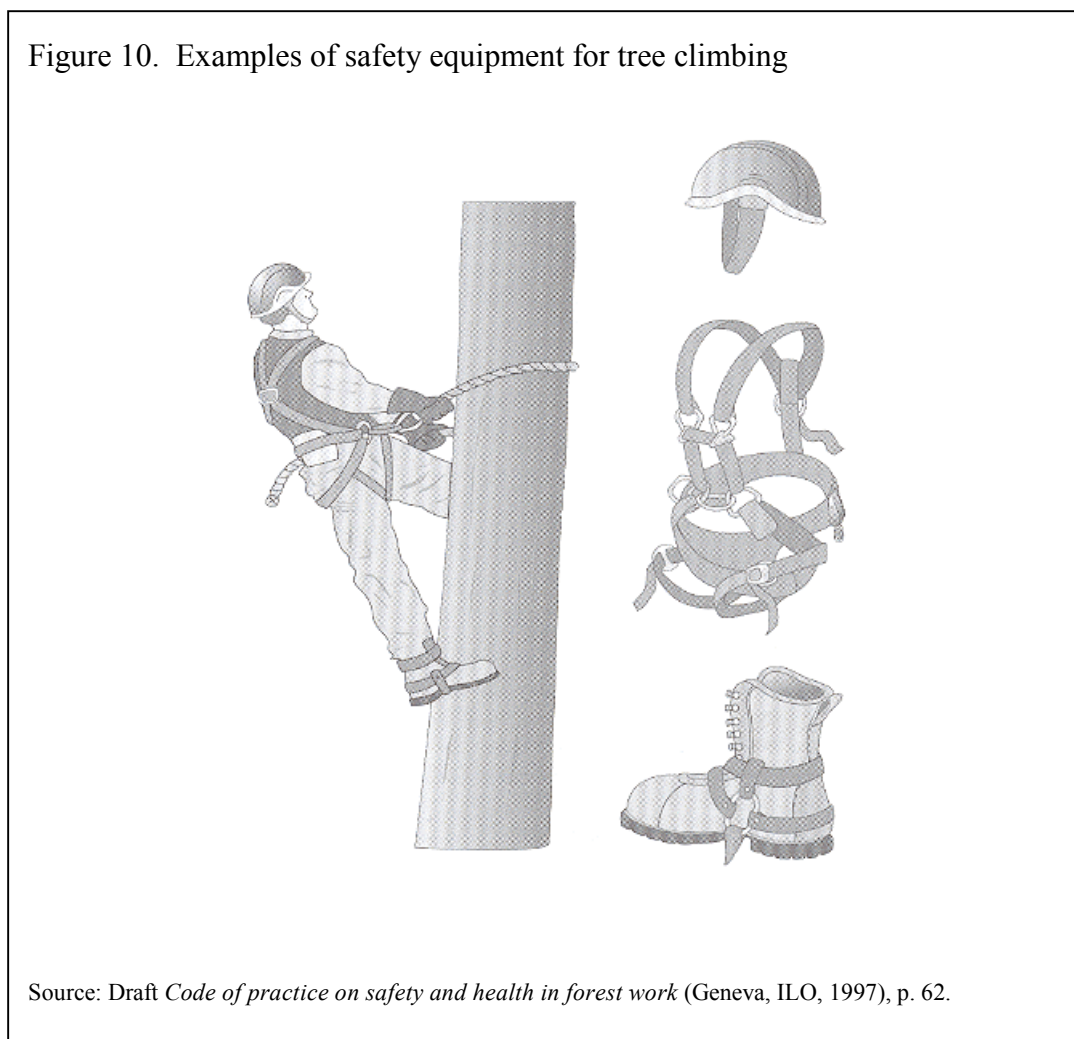


641. Climbers should be aware of the differing characteristics of tree species to be climbed and the difference between live and deadwood.

### Equipment

642. Climbers should be equipped with safety equipment with a sufficient breaking strength (see figure 10), including:

- (a) a safety belt with double "D" rings;
- (b) steel spurs long and sharp enough to hold in any tree in which they are used.



643. Safety belts should be of high-quality material. Where cutting tools are used by the climber, safety belts with wire ropes, ropes with a steel core or a high-quality steel safety chain of sufficient strength should be used. Climbers should take proper care of safety belts and inspect them daily during use.

644. Fastening, adjustment and unfastening of safety ropes should be simple and quick.

## **Safety and health in forestry work**

645. An extra set of climbing equipment should be available at the worksite, so as to be able to assist or rescue a climber in the case of an emergency, for example injury or vertigo.

646. Depending on the type of work to be done in the tree, a fall arrest system or work positioning equipment may be required.

647. Where the climber's rope cannot be kept taut enough to prevent a significant vertical fall, i.e. 0.5 m or more, a suitable fall arrest system should be worn comprising a full body harness and an energy absorbing strop.

648. Ladders used for access into a tree should incorporate a non-slip or stabilizing base and must be supported by ground staff until a rope is attached from the tree to the ladder.

649. When using a "tree bicycle" (➔glossary), climbers should ensure that the equipment is in perfect condition and that it is used according to the manufacturer's recommendations.

650. When topping or debranching standing trees, the lightest chain-saw possible should be used.

651. Climbers and ground staff should wear:

- (a) safety helmets; climbing helmets when climbing;
- (b) boots or shoes with good grip and safety toecaps.

652. Climbers and ground staff using chain-saws should be provided with and wear personal protective equipment according to the provisions in Chapter 7.

## **Operation**

653. Climbing irons or spikes should be kept sharp at all times to ensure a secure hold in the tree.

654. Climbing equipment should be kept well away from cutting tools, fuel, chemicals and any other potential cause of damage while on site and during storage and transit.

655. Defective climbing equipment should be withdrawn immediately from use.

656. Equipment, such as ascendeurs and descendeurs, should be used in accordance with the manufacturer's instructions and not be modified or repaired by the user.

657. Climbing or passline equipment should not be used for other purposes.

658. Climbers' safety ropes should encircle the tree before they leave the ground, except when climbers are riding a passline.

659. When working in the tree, climbers should be secured by means of a safety rope or strop at all times.

660. Ground staff should:

- (a) ensure that all equipment is serviceable before being passed up to climbers;

- (b) maintain concentration, watch the climbers and anticipate their needs, passing up tools or other equipment;
- (c) keep climbing and work ropes on the ground in a safe position away from obstructions, vehicles, other equipment, and free of knots, kinks, tangles, debris and branch wood;
- (d) ensure that all reasonable precautions are taken to exclude all public and traffic from the work area while work is in progress.

661. Trees should not be topped unless a second worker is in sight of the climber.

662. Ladders should be checked for obvious defects before use.

663. When erecting a ladder for access into a tree, the top of the ladder should be set firmly, to minimize the risk of the ladder twisting. The base of the ladder should be positioned approximately one quarter of the height of the ladder away from a vertical line dropped from the point of contact with the tree, unless ladders are used which are fixed to the tree by ropes or special attachment systems designed for this purpose.

664. When using a ladder for ascent into a tree, the climbers should be secured to the tree before moving off the top of the ladder or carrying out any other work.

665. When the climber is using a pass-line on a spar tree in cable systems, an assistant should stand by the pass-line drum to make sure that the line is evenly spooled onto the drum.

666. When using climbing irons, climbers should be secured to the tree with either:

- (a) a climbing rope; or
- (b) a wire or wire-reinforced strop when using a chain-saw.

667. Climbers working with climbing irons should:

- (a) when ascending, be secured and remain tied to the tree when passing obstructions such as branches; the means of attachment to the tree should be adjustable to allow for the taper of the trunk and for passing the rope over small obstructions such as branch stubs;
- (b) when using a chain-saw, check the positioning of the strop all around the circumference of the tree in relation to the position of the cut.

668. Using a rope and harness, climbers should:

- (a) when ascending, be securely attached to a suitable anchor point at all times by means of the climbing rope, or strop;
- (b) when using anchor points, transfer their weight to the new anchor point before releasing the previous one;
- (c) when ascending to a suitable anchor point, maintain secure attachment before moving to the point of work;
- (d) be securely anchored to the tree by the climbing rope, which must be kept as taut as possible, when moving in the tree;

## **Safety and health in forestry work**

(e) be secured by a supplementary anchor point, when working out on a limb where a fall or swing can be foreseen.

669. Equipment should be passed to the climber only by use of the climbing rope or a separate tool line.

670. Chain-saws should:

- (a) be checked, started and warmed up by ground staff before being passed up to the climber, with the chain brake applied;
- (b) for general use, be attached to the climbing harness with a strop; where there is a risk that the chain-saw might be trapped or taken with a severed section, the chain-saw should not be attached to the climber;
- (c) be switched off or the chain brake applied after each cutting operation.

671. Tools used by the climber, except the chain-saw, should be safely secured to the belt when not in use.

672. Climbers and ground staff should ensure that risk of contact with either people or property from falling debris or equipment is minimized.

673. While the climber is working in a tree, other persons should keep a sufficient distance from the tree to be clear of falling objects.

674. Climbers should give warning when any equipment or material is in danger of dropping, or is to be dropped deliberately.

675. Climbers should descend to the ground slowly in a controlled manner.

676. During descent, climbers should ensure that the climbing rope is of sufficient length, remains undamaged and that the end is knotted to prevent its involuntary release from the climbing knot or descendeur.

## **Clearance of windblow**

### **Organization**

677. Clearing windblow is one of the most hazardous operations in forestry. Managers should resist the urge to move in hastily, and should make sure that no intervention takes place before the situation has been fully appraised and the operation adequately prepared.

678. In areas where major windblow, snow breakage, forest fires or other catastrophes are a recurrent feature, contingency plans and checklists should be available to help staff to cope with the situation in an organized manner.

679. Only workers fully competent in felling, the taking down of hung-up trees, debranching and crosscutting of stems under tension should be employed to deal with windblown trees. If this operation has to be carried out motor-manually, work organization, which may include arrangements for remuneration, should ensure that safety has priority.

680. Prior to clearance of windblow, all personnel engaged in the operation should be instructed about the specific high risks connected with that task,

## **High-risk operations**

particularly with cutting and handling wood under tension, and the methods to be used when dealing with trees which are lying on top of or across each other.

681. Working hours and rest periods should be strictly maintained, to reduce the risk of accidents due to fatigue and loss of concentration.

682. No work should be undertaken in the risk zone, unless completely unavoidable.

683. Work should commence and be carried out in the felling direction of the windblown trees. On slopes, the progression of work should be from the bottom of the slope.

684. The safest method available should be selected for the clearance of windblow.

685. No chain-saw operators or other workers should be allowed on site before the trees have been disentangled by mechanical means.

## **Equipment**

686. Clearance of windblow should not be undertaken without a winch being readily available. Mechanized methods of clearance should be used whenever practicable.

687. Workers should be equipped with and use personal protective equipment in accordance with the provisions in Chapter 7.

688. Tools and machines should be designed and equipped in accordance with the provisions in Chapter 6.

## **Operation**

689. Workers should not walk or work under unstable windblown trees or root plates and not walk on the stems of windblown trees.

690. Suitable escape routes should be selected and be cleared of any obstructions which could hinder a quick escape.

691. If there are trees lying over each other, manual or motor-manual work should start with the tree on top. Progress of work on a fallen tree should be from butt to tip whenever practicable.

692. The use of chain-saws above shoulder height is extremely dangerous, and should be avoided.

693. Workers should look out carefully for dead wood, insecure branches and broken tops, both in the trees to be felled and in the adjacent ones.

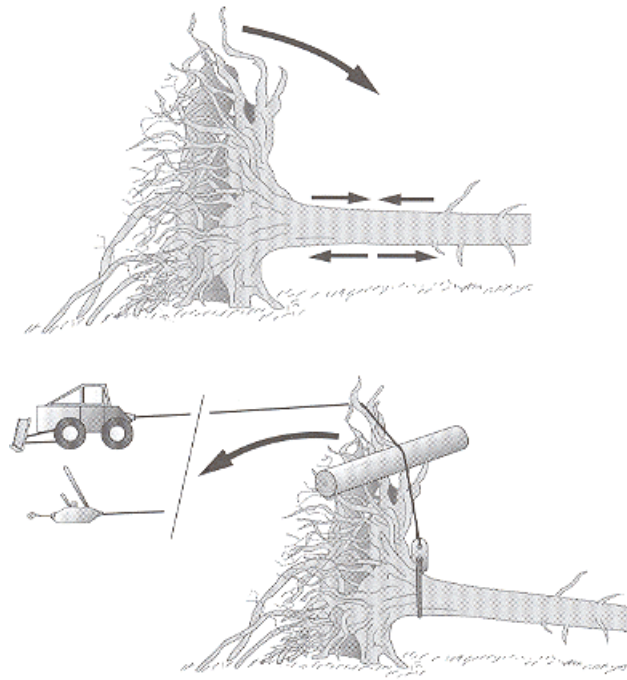
694. Tension in stems and root plates and the direction of such tension should be observed carefully.

695. Severing a fallen tree from the root plate is probably the most hazardous task in forestry work. Whenever practicable, the severing cut should be made by machines, i.e. by using mechanized fellers, harvesters, excavator-mounted shears or similar equipment.

## Safety and health in forestry work

696. Root plates should be secured with winches or other suitable means to prevent them from falling over when the stem is severed (see figure 11).

Figure 11. Severing root plates in windblow



Note: Tension in the stem is reversed when using a winch to secure and put the root plate back into place. This is only one of the many situations encountered in windblow; other methods than the one shown may be more appropriate.

Source: Based on illustrations provided by the Bundesverband der Unfallversicherungsträger der öffentlichen Hand e.V. (BAGUV), Munich.

697. A severing cut at the butt end of the stem should be made at a safe distance from the root plate. If necessary, a block measuring about half the diameter of the root plate should be left on the root plate to prevent it from falling over after being severed.

698. The first severing cut should be made into the compression wood. To reduce the danger of the stem springing upwards, the final severing cut should be made into the tension wood a hand's breadth away from the first cut, and into that part of the stem which is least likely to move.

699. When lateral tension is present in the stem, the worker should always stand on the compression wood side to make the final cut.

700. Whenever feasible, a winch should be used to restrain stems under tension.

701. Every effort should be made to put the root plate back in place once the stem is severed, preferably using a machine or a winch to pull it back.

702. Leaning trees should be felled using a modified felling technique in order to avoid the saw being pinched when making the scarf and to ensure that tension is released slowly and in a controlled manner to avoid splitting of the tree during the backcut, which can be very hazardous.

703. Broken treetops should be pulled down using a machine, from a safe distance. If a machine is not available, the tree should be felled sideways.

704. Topless tree trunks should be felled by using a bigger notch than normal and controlling the felling direction with wedges.

705. When trees have been severed from the root plate they should be extracted to a place where debranching and conversion can be undertaken safely.

## Fire-fighting

### **Organization**

706. Fire-fighting requires an effective organization and clear plans that can be carried out rapidly in case of an emergency. Priorities of fire-fighting should be to:

- (a) protect human life;
- (b) prevent damage to dwellings and equipment;
- (c) protect the forest.

At no time should the safety of human life be compromised in order to protect dwellings, equipment or the forest.

707. The risks involved should be assessed before the work commences. This assessment should take account of all factors relating to the current and forecast weather and fire conditions, available resources and equipment, with particular regard to the safety of firefighters. Risk assessment should continue throughout the fire-fighting activity, as conditions can change quickly and unpredictably. Fire teams should have a briefing, including the results of the risk assessment and safety considerations, at the beginning of operations and then again each day to ensure that safety is prioritized.

708. When preparing a plan of action, consideration needs to be given to the specific skills required of the firefighters.

709. Good communication between all those involved needs to be maintained at all times, during both training exercises and actual fire operations. All firefighters should be aware of the command structure and the need to ensure the safety of other firefighters, as well as to comply with all instructions issued by supervisors. Fire teams should have a supervisor whose responsibilities should include ensuring that all firefighters are aware of safety procedures and follow these procedures.

## **Safety and health in forestry work**

710. Machine operators should not work alone unless they are able to communicate immediately with other nearby firefighters in the event of an emergency.

711. Teams of firefighters should ideally include persons who are familiar with the terrain.

712. Roads and tracks in the area should be closed if there is danger to persons not involved in the fire-fighting activity.

713. Sufficient rest periods and an adequate supply of food and beverages should be provided to avoid overexertion.

## **Personnel**

714. Firefighters should be in good physical condition. Special fire-fighting crews should be recruited only from among personnel who are in an excellent state of health.

715. All forest personnel who may be called upon for firefighting should receive training including:

- (a) safe use of basic fire-fighting tools and equipment;
- (b) measures to take in an emergency to escape a fire area.

716. Firefighters should receive special training in:

- (a) all relevant fire-fighting techniques and use of related equipment;
- (b) accident risks and prevention;
- (c) first aid applicable to conditions commonly encountered in fires.

## **Equipment**

717. Firefighters should be provided with and use:

- (a) overalls of a suitable material to provide protection from heat radiation and sparks, in a highly visible colour; suitable fabrics include cotton, wool, denim or special flame-resistant material. Flammable fabrics or those that might melt, such as nylon or other synthetics, including safety trousers and chaps containing such fabrics, should not be worn;
- (b) safety helmets, preferably with a fire-resistant face shield. When working close to helicopters, helmets should be secured by a chin-strap;
- (c) goggles and smoke masks, when conditions require;
- (d) protective gloves which provide protection against cuts, punctures and heat penetration;
- (e) non-slip, calf-length boots.

718. Fire-fighting equipment should be inspected for defects before each fire drill and before use in an emergency, and should be reinspected afterwards. It should be maintained in accordance with the manufacturer's recommendations.



719. Machines should be equipped and designed according to the provisions in Chapter 6. In addition, machines operated at night should be equipped with at least one forward and one rear light to permit safe working.

720. Lookout towers for the detection of forest fires should be of a solid construction. Stairways, platforms and railings should be inspected annually. Tops of stairways should be closed by trapdoors to prevent accidents caused by falling.

### **Operation**

721. All personnel engaged in fire-fighting should avoid any unnecessary risks.

722. Firefighters should be instructed thoroughly about ways of access to and egress from the scene of the fire, particularly the whereabouts of escape routes.

723. No one should work beyond the calling distance from another person.

724. Firefighters should work at a steady pace, and pause to recuperate when necessary. They should drink plenty of liquid to replace loss caused by excessive perspiration.

725. Firefighters should always stay within the burnt area at a fire or in firebreaks, roads or cleared ground. They should avoid being in the unburnt area.

726. If cut off by the fire, firefighters should try to move into an area which has already burnt.

727. Burning trees should be passed on the uphill side or above the lean. Special caution is needed near overhead electricity lines.

728. When fire-fighting includes the felling and cutting of trees, the safety requirements for harvesting operations of this code should apply whenever practicable.

729. Firefighters working in close proximity to machines should do so, where practicable, with the knowledge and agreement of the machine operator, and only in accordance with any instructions by the supervisor.

730. Firefighters working in close proximity to any aircraft should abide by all directions given by the pilot or authorized ground personnel. Firefighters working in the drop-zone of aircraft applying water, foam or retardant should follow all safety and work instructions given by the supervisor.

731. When controlled burning is undertaken, workers should adhere to the planned light-up pattern and not deviate from this unless they are instructed to do so. When using a hand burner, the operator should be within sight and sound of another person, generally not more than 20 m distant.

732. Vehicles should be parked in the direction of the escape route with doors closed, windows up and keys in the ignition, and in a position that other vehicles may pass in an emergency.



## Glossary of technical terms

*Anchor:*

A stump or tree to which the end of the skyline cable in a cable crane extraction system is securely attached.

*Buttress:*

A ridge of wood that grows in the angle between a lateral root and the base of a tree stem, to provide lateral stability to the stem.

*Cable:*

A flexible steel rope made up of numerous wire strands that are twisted helically together around a core of wire, wire rope, fibre, plastic or other material.

*Cable crane:*

Any of a variety of terrain transport systems in which suspended cables are used to convey logs to the landing.

*Cableway:*

The pathway along which logs are extracted with a cable crane.

*Canopy:*

The part of the forest formed by the crowns of the dominant trees.

*Choker:*

A noose of wire or fibre rope or chain that is wrapped around a log and then attached to a means of conveyance, in order to bring the log to a skidder or landing.

*Controlled burning:*

Preventive use of fire under controlled and favourable conditions, when for instance there is very little wind or a forecast of calm weather, to reduce the quantity of combustible material on the forest floor that would otherwise be a serious fire hazard.

*Conversion:*

The act of changing a felled tree into a utilizable product by means of debranching and crosscutting.

*Crosscutting:*

The act or process of transversely cutting the stem or branches of a felled tree into logs (in North America referred to as "bucking")

*Cutting:*

In timber harvesting, a compound term referring to the operations of felling, debranching, debarking and crosscutting.

*Cut-up tree:*

A tree that remains upright on its stump after all felling cuts have been made.

*Debranching:*

The severing of branches from the stem of a felled tree (in some countries also referred to as "limbing", "delimiting" or "sneeding")

*Ergonomic principles:*

A concept whereby the work to be carried out is organized and specified – and the tools and equipment designed and used – in such a way as to be matched with the physical and mental characteristics and capacity of the worker.

*Extraction:*

The act of transporting felled produce from the felling site to a landing.

*Extraction route:*

The planned route over which produce is extracted from stump to landing.

## **Safety and health in forestry work**

### *Falling object protective structure (FOPS):*

A falling object protective structure or frame protects forest machinery or vehicles against falling branches, parts of tree crowns or logs. ISO 8083 contains guidance on such structures.

### *Felling:*

The act of severing a standing tree. Compare *Cutting*.

### *Forwarder:*

A machine used for the extraction of logs, which carries the load completely off the ground, either within its own frame or on a trailer. Forwarders are usually equipped with a hydraulic or mechanical crane for self-loading and unloading of logs.

### *Grapple:*

A hinged hydraulic mechanism capable of being opened and closed mechanically, which is used to grip logs during extraction or loading.

### *Harvesting:*

The aggregation of all operations, including pre-harvest planning and post-harvest assessment, related to the felling of trees and the extraction of their stems or other usable parts from the forest, for subsequent processing into industrial products.

### *Hauling:*

Conveyance of usable produce from the landing to the processing facility or other destination.

### *Headboard:*

A vertical construction positioned between the load and the cab of a vehicle used for the transport of timber (typically a forwarder or heavy goods road vehicle), with the specific purpose of protecting the operator.

### *High flotation tyres:*

A tyre specially designed to incorporate a low and broad profile at the contact point of the terrain. This significantly reduces damage to the soil structure and the risk of bogging on soft, wet terrain.

### *Hung-up tree:*

This is a tree that has been cut, windblown or otherwise pushed against another tree, thus preventing it from falling to the ground (sometimes also "hung-up" tree).

### *Kick-back:*

A sudden, violent upward movement of the guide bar of a chain-saw caused by the chain on the upper tip of the guide bar being intercepted and accelerated by an object such as a stem or a branch. It is very difficult to control and very hazardous.

### *Landing:*

A cleared area where produce is collected during extraction, in preparation for transport to the processing facility or other destination.

### *Mechanized felling:*

Felling of trees with specialized machines, such as feller bunchers and harvesters.

### *Motor-manual method:*

Forest work performed with hand-held machines, most commonly in connection with cutting of trees using chain-saws, but also used for brushcutters and others.

### *Operator protection:*

Operator protective structures (OPS) are frames or structures to prevent objects from entering the cab of a machine or vehicle. ISO 8084 provides guidance on such structures.

### *Passline:*

A small line threaded through a pulley block at or near the top of a spar tree, to assist the tree climber.

### *Personal protective equipment:*

Any item which is worn or used by a worker as a means of removing or reducing previously identified risks of personal injury or occupational disease.

*Processing:*

See *Conversion*.

*Pruning:*

The act of severing branches from a standing tree.

*Roll-over protection:*

Roll-over protective systems or structures (ROPS) are frames or structures to protect the cab of a machine or vehicle in the event of overturning. ISO 3471 and ISO 8082 provide guidance on such structures.

*Root plate:*

The upturned root system of a windblown tree.

*Sappie:*

A hand tool consisting of a slightly curved, pointed steel hook mounted on a strong wooden handle 100 to 130 cm long, used for handling and short-distance skidding of logs.

*Skidding:*

A method of ground-based extraction in which logs, poles or whole trees are dragged to the landing, most commonly by means of a tractor equipped with a winch or grapple, known as a skidder.

*Skill certificates:*

A certificate awarded following the successful completion of a skills assessment.

*Spar:*

A tower, mast, tree or A-frame located at the opposite end of the cableway from the yarder.

*Stanchions:*

Upright posts or supports for confining logs on trucks, trailers or other vehicles.

*Sulky:*

An open framework, mounted on wheels or skids, which is used to suspend the leading ends of logs being extracted manually, with draught animals or with skidding tractors.

*Tending:*

A group of maintenance operations to ensure that a tree plantation or young naturally regenerated stands are adequately established and protected up to the production stage – or up to canopy closure.

*Tree bicycle:*

A tree-climbing device with two metal bands encircling the stem and providing support for the tree climber's feet.

*Winch:*

A rotating powered drum used to haul in or pay out cable.

*Windblow:*

Catastrophic damage to standing trees as a result of a gale or storm force wind, with trees being thrown or broken.



## References and further reading

### Relevant publications

- E. Apud; et al.: *Guide-lines on ergonomic study in forestry prepared for research workers in developing countries* (Geneva, ILO, 1989).
- E. Apud; S. Valdés: *Ergonomics in forestry: The Chilean case* (Geneva, ILO, 1995).
- Arbetsmiljöinstitutet, Forskningsstiftelsen Skogsarbeten: *Ergonomisk checklista för skogsmaskiner* [Ergonomic checklist for forest machines] (Kista, Forskningsstiftelsen Skogsarbeten, 1989; new edition expected 1998).
- BAGUV: *Gewußt wie – Windwurf – aufarbeitung* [How to harvest windfall], No. GUV 51.14.1 (Munich, Bundesverband der Unfallversicherungsträger der öffentlichen Hand e. V., 1990).
- : *Sichere Waldarbeit and Baumpflege* [Safe forestry work and care of trees], Schriftenreihe des BAGUV, No. GUV 50.0.7 (Munich, Bundesverband der Unfallversicherungsträger der öffentlichen Hand e.V., 1992).
- A. Bakar Che Man; D. Gold: *Safety and health in the use of chemicals at work: A training manual* (Geneva, ILO, 1993).
- BVLB: *Land- und -forstwirtschaftliche Maschinen, allgemeine Prüfliste* [Agricultural and forestry machinery: General checklist] (Munich, Bundesverband der Landwirtschaftlichen Berufsgenossenschaften, 1995).
- D. P. Dykstra; R. Heinrich: *Model code of forest harvesting practice*, (Rome, FAO, 1996).
- FAO: *Introduction to ergonomics in forestry in developing countries*, FAO Forestry Paper No. 100 (Rome, 1992).
- FAO/IAEA/ILO/OECD-NEA/PAHO/WHO: *International basic safety standards for protection against ionizing radiation and for the safety of radiation sources*, Safety Series No. 115 (Vienna, IAEA, 1996).
- FAO/ILO: *Chain-saws in tropical forests*, FAO Training Paper No. 2 (Rome, FAO, 1980).
- Forestry and Arboriculture Safety and Training Council: "Forest industry safety guides" (36 leaflets) (Edinburgh, The Forestry Commission, 1996).
- J. M. Golsse: *Revised FERIC ergonomic checklist for Canadian forest machinery* (Pointe Claire, Forest Engineering Research Institute of Canada, 1994).
- ILO: *Occupational safety and health in forestry*, Report III, Forestry and Wood Industries Committee, Second Session, Geneva, 1991 (Geneva, 1990).
- : *Safety and health in the use of agrochemicals: A guide*, an ILO contribution to the International Programme on Chemical Safety (Geneva, 1991).
- : *Labour inspection in forestry and small-scale sawmilling*, video (Geneva, 1993).
- : *Safety in the use of Chemicals at work: An ILO code of practice* (Geneva, 1993).
- : *Management of alcohol- and drug-related issues in the workplace: An ILO code of practice* (Geneva, 1996).
- : *Recording and notification of occupational accidents and diseases: An ILO code of practice* (Geneva, 1996).
- : *Code of practice on safety and health in forest work*, Sectoral Activities Programme Document MEFW/1997/3(Rev.) (Geneva, 1997).
- : *Encyclopaedia of occupational health and safety*, Fourth edition, Vol. 3 (Geneva, 1998).

## Safety and health in forestry work

- : "FORWORKNET – the Forestry Workforce Network – Update and membership register", Industrial Activities Branch, ILO (Geneva, various years).
- K. Johansson; B. Strehlke: *Improving working conditions and increasing profits in forestry*, Sectoral Activities Programme Working Paper No. 99 (Geneva, ILO, 1996).
- Joint FAO/ECE/ILO Committee on Forest Technology, Management and Training: *Safety and health in forestry are feasible*, proceedings of seminar held in Emmental, Switzerland, 7-11 October 1996 (Berne, 1997).
- : *Clothing and safety equipment in forestry*, seminar on clothing and safety equipment in forestry, Kuopio, Finland, 27 June-1 July 1994 (Kuopio, Kuopio University Printing Office, 1994).
- Kuratorium für Waldarbeit und Forsttechnik (KWF): *Prüfliste: Forstspezialschlepper, Rückzüge, selbstfahrende Vollernter* [Checklist: Skidders, forwarders and harvesters] (Darmstadt, Kuratorium für Waldarbeit und Forsttechnik/Deutsche Prüfstelle für Land- und -Forsttechnik, 1995).
- The Oil Industry International Exploration and Production Forum (E&P Forum): *Guidelines for the development and application of health, safety and environmental management systems*, Report No. 6.36/210 (London, 1994).
- Oregon Occupational Safety and Health Division (OR-OSHA): *Oregon occupational safety and health code – Forest activities*, Oregon Administrative Rules, Chapter 437 (Salem, Oregon, 1992).
- SUVA (Schweizerische Unfallversicherungsanstalt): *Der produktive und sichere Forstbetrieb* [Training materials for safe and productive forestry management] (in German) (Lucerne, Switzerland, 1995).

## Relevant international labour standards

### ILO Conventions

No.	Title
81	Labour Inspection, 1947 [and Protocol, 1995]
119	Guarding of Machinery, 1963
127	Maximum Weight, 1967
129	Labour Inspection (Agriculture), 1969
135	Workers' Representatives, 1971
138	Minimum Age, 1973
148	Working Environment (Air Pollution, Noise and Vibration), 1977
155	Occupational Safety and Health, 1981
161	Occupational Health Services, 1985
170	Chemicals, 1990

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No.	Title
81	Labour Inspection, 1947
116	Reduction of Hours of Work, 1962
118	Guarding of Machinery, 1963
128	Maximum Weight, 1967
133	Labour Inspection (Agriculture), 1969
143	Workers' Representatives, 1971
146	Minimum Age, 1973
156	Working Environment (Air Pollution, Noise and Vibration), 1977
177	Chemicals, 1990



## Relevant International Organization for Standardization (ISO) standards

**Standards related to all types of forestry equipment**

<i>No.</i>	<i>Title</i>
ISO 3600:1996	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Operator's manuals – Content and presentation
ISO 11684:1995	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Safety signs and hazard pictorals – General principles
ISO/DIS 3767-1: n.d.	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays (Revision of ISO 3767-1:1991)
ISO/DIS 3767-4:1993	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays – Part 4: Symbols for forestry machinery
ISO/DIS 3767-5:1992	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays – Part 4: Symbols for manual portable forestry machinery
ISO 3789-1:1982	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment-Location and method of operator controls – Part 1: Common controls

**Standards related to brush-cutters**

<i>No.</i>	<i>Title</i>
ISO 7112:1982	Machinery for forestry – Portable brush-saws – Vocabulary
ISO 11682:1993	Brush-cutters and grass-trimmers – Technical data
ISO 11806:1997	Agricultural and forestry machinery – Portable handheld combustion engine driven brush cutters and grass trimmers – Safety
ISO/DIS 7113: n.d.	Portable hand-held forestry machines – Brush-cutters – Cutting attachments (Revision of ISO 7113:1991)
ISO 5380	Machinery for forestry – Portable brush-saws – Saw blade guard – Strength
ISO 7918:1995	Forestry machinery – Portable brush-cutters and grass-trimmers – Cutting attachment guard dimensions
ISO 8380:1993	Forestry machinery – Portable brush-cutters and grass-trimmers – Cutting attachment guard strength
ISO 10884:1995	Manually portable brush-cutters and grass-trimmers with internal combustion engine – Determination of sound power levels – Engineering method (Grade 2)
ISO 7916:1989	Forestry machinery – Portable brush-saws – Measurement of hand-transmitted vibration
ISO 8893:1997	Forestry machinery – Portable brush-saws – Engine performance and fuel consumption

**Standards related to chain-saws**

<i>No.</i>	<i>Title</i>
ISO 6531:1982	Machinery for forestry – Portable chain-saws – Vocabulary
ISO 6532:1993	Portable chain-saws – Technical data
ISO 11681-1:1996	Machinery for forestry – Portable chain-saws – Safety requirements and testing – Part 1: Chain-saws for normal forest work
ISO 6534: 1992	Portable chain-saws – Hand guards – Mechanical strength
ISO 6533:1993	Forestry machinery – Portable chain-saws – Front hand-guard – Dimensions

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ISO 7914:1994	Forestry machinery – Portable chain-saws – Minimum handle clearance and sizes
ISO 7915:1991	Forestry machinery – Portable chain-saws – Determination of handle strength
ISO 8334:1985	Forestry machinery – Portable chain-saws – Determination of balance
ISO 6535: 1991	Portable chain-saws – Chain brake performance
ISO 9412: 1991	Portable chain-saws – Automatic chain brake and cutting equipment-Operator's safety test
ISO 13772:1997	Forestry machinery – Portable chain-saws – Non-manually actuated chain brake performance
ISO 8952	Manually portable forest machinery – Cutting equipment – Dimensions
ISO 10726:1992	Portable chain-saws – Chain catcher – Dimensions and mechanical strength
ISO 7505:1986	Forestry machinery – Chain-saws – Measurement of hand-transmitted vibration
ISO 9518:1992	Forestry machinery – Portable chain-saws – Kickback test
ISO 11805	Manually portable forest machinery – Chain-saws for tree service – Safety requirements and testing
ISO 9467:1993	Forestry machinery – Portable chain-saws and brush-cutters – Exhaust system-caused fire risk
ISO 7293:1997	Forestry machinery – Portable chain-saws – Engine performance and fuel consumption

## **Standards related to self-propelled forestry machinery**

<i>No.</i>	<i>Title</i>
ISO 3339-0:1986	Tractors and machinery for agriculture and forestry – Classification and terminology – Part 0: Classification system and classification
ISO 6814:1983	Machinery for forestry – Mobile and self-propelled machinery – Identification vocabulary
ISO 13860: n.d.	Machinery for forestry – Forwarders – Terminology and specifications
ISO/DIS 13861: n.d.	Machinery for forestry – Wheeled skidders – Terminology and specifications
ISO/DIS 13862: n.d.	Machinery for forestry – Feller bunchers – Terminology and specifications
ISO 11850:1996	Machinery for forestry – Self-propelled machinery – Safety
ISO 8082:1994	Self-propelled machinery for forestry – Roll-over protective structures – Laboratory tests and performance requirements
ISO 3471: 1994	Earth-moving machinery – Roll-over protective structures – Laboratory tests and performance requirements
ISO 8083:7989	Machinery for forestry – Falling-object protective structures – Laboratory tests and performance requirements
ISO 8084:1993	Machinery for forestry – Operator protective structures – Laboratory test and performance requirements
ISO 11169:1993	Machinery for forestry – Wheeled special machines – Vocabulary, performance test methods and criteria for brake systems
ISO 11512:1995	Machinery for forestry – Tracked special machines – Performance criteria for brake systems
ISO 8797	Machinery for forestry – Seat belts and anchorages
ISO 3789-4:1988	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Location and method of operator controls – Part 4: Controls for forestry log loaders

### Standards related to other equipment

<i>No.</i>	<i>Title</i>
ISO 6816:1984	Machinery for forestry – Winches – Classification and nomenclature
ISO 6687:1994	Machinery for forestry – Winches – Performance requirements
ISO 3789-4:1988	Tractors, machinery for agriculture and forestry – Technical means for ensuring safety – Part 4: Forestry winches

### Relevant European standards

European Committee for Standardization: Agricultural and forestry machinery – Portable chain-saws – Safety, EN 608 (Brussels, 1994).

### Other relevant international classifications

ILO: *International Standard Classification of Occupations: ISCO-88* (Geneva, 1990)

ILO: "Resolution concerning the International Classification of Status in Employment (ICSE)", Fifteenth International Conference of Labour Statisticians (Geneva, 1993)

ILO: "Resolution concerning statistics of occupational injuries and accidents", Sixteenth International Conference of Labour Statisticians (Geneva, 1998)

United Nations: *International Standard Industrial Classification of all Economic Activities (ISIC)* (third revision), statistical papers, series M, No. 4, rev. 3 (New York, 1990)



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## **Safety and health in forestry work**

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