

HEALTH AND SAFETY IN EMPLOYMENT ACT 1992

APPROVED CODE OF PRACTICE FOR SAFETY AND
HEALTH IN TREE WORK

PART 2: MAINTENANCE OF TREES AROUND POWER LINES



DEPARTMENT OF
LABOUR
TE TARI MAHI

ISSUED AND APPROVED BY
THE MINISTER OF
LABOUR
JULY 1999

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NOTICE OF ISSUE

I have issued this *Approved Code of Practice for Safety in Tree Work — Part Two: Maintenance of Trees Around Power Lines*, being a statement of preferred work practices or arrangements for the purpose of ensuring the health and safety of persons to which this code applies and persons who may be affected by the activities of this code.

A handwritten signature in black ink, appearing to read 'J M Chetwin', with a horizontal line underneath it.

J M Chetwin
Secretary of Labour

FOREWORD

I have approved this statement of preferred work practices, which is an *Approved Code of Practice for Safety in Tree Work — Part Two: Maintenance of Trees Around Power Lines* under section 20 of the Health and Safety in Employment Act 1992. When a code is approved, a Court may have regard to it in relation to compliance with the relevant sections of the Health and Safety in Employment Act. This means that if an employer in an industry or using a process to which an approved code applies can show compliance with that code in all matters it covers, a Court may consider this to be compliance with the provisions of the Act to which the code relates.

A handwritten signature in black ink, appearing to read 'Doug Kidd', with a large, sweeping flourish at the end.

Hon. Doug Kidd
Minister of Labour

SUMMARY OF THE HEALTH AND SAFETY IN EMPLOYMENT ACT 1992

The principal object of the Health and Safety in Employment Act 1992 is to prevent harm to employees at work. To do this, it imposes duties on employers, employees, principals and others, and promotes excellent health and safety management by employers. It also provides for the making of regulations and codes of practice.

REGULATIONS

Regulations are promulgated from time to time under the HSE Act. Regulations may impose duties on employers, employees, designers, manufacturers, and others relating to health and safety. These regulations may apply with respect to places of work, plant, processes or substances and may have been made to deal with particular

problems that have arisen. Under the Health and Safety in Employment Regulations, notification of certain forestry work is required by the Occupational Safety and Health Service of the Department of Labour.

APPROVED CODES OF PRACTICE

The Act provides for the development and approval of statements of preferred work practice or arrangements, that may be approved as "approved codes of practice". These are recommended means of compliance with provisions of the Act, and may include procedures which could be taken into account when deciding on the practicable steps to be taken. Compliance with codes of practice will not be mandatory. However, they may be used as evidence of good practice in Court.

PRINCIPAL'S DUTIES

A person or company (called a "principal") that hires any contractor must take all practicable steps to ensure that the contractor, or subcontractors or their employees are not harmed while doing any work contracted to be done for the principal.

EMPLOYER'S DUTIES

Employers have the most duties to perform to ensure the health and safety of employees.

If you are an employer, then you have a general duty to take all practicable steps to ensure the safety of employees while at work. (This is set out in section 6.)

In particular, you are required to take all practicable steps to:

- Provide and maintain a safe working environment;
- Provide and maintain facilities for the safety and health of employees at work;
- Ensure that machinery and equipment in the place of work is designed, made, set up and maintained to be safe for employees;
- Ensure that employees are not exposed to hazards in the course of their work; and
- Develop procedures for dealing with emergencies that may arise while employees are at work.

Taking "all practicable steps" means what is reasonably able to be done to achieve the result in the circumstances, taking into account:

- The severity of any injury or harm to health that may occur;
- The degree of risk or probability of that injury or harm occurring;
- How much is known about the hazard and the ways of eliminating, reducing or controlling it; and

- The availability, effectiveness and cost of the possible safeguards.

HAZARD MANAGEMENT

Employers must have an effective method to identify and regularly review hazards in the place of work (existing, new and potential). They must determine whether the identified hazards are significant hazards and require further action. If an accident or harm occurs that requires particulars to be recorded, employers are required to investigate it to determine if it was caused by or arose from a significant hazard.

"Significant hazard" means a hazard that is an actual or potential cause or source of:

- Serious harm; or
- Harm (being more than trivial) where the severity of effects on a person depends (entirely or among other things) on the extent or frequency of the person's exposure to the hazard; or
- Harm that does not usually occur, or usually is not easily detectable, until a significant time after exposure to the hazard.

WHERE THE HAZARD IS SIGNIFICANT

The Act sets out the steps employers must take:

- Where practicable, the hazard must be *eliminated*,

- If elimination is not practicable, the hazard must be *isolated*.
- If it is impracticable to eliminate or isolate the hazard, the employer must *minimise* the likelihood that employees will be harmed by the hazard.

Where the hazard has not been eliminated or isolated, employers must, where appropriate:

- Ensure that protective clothing and equipment is provided, accessible and used;
- Monitor employees' exposure to the hazard;
- Seek the consent of employees to monitor their health; and
- With their informed consent, monitor employees' health.

INFORMATION FOR EMPLOYEES

Before employees begin work, they must be informed by their employer of:

- Emergency procedures;
- Hazards employees may be exposed to while at work;
- Hazards employees may create which could harm people;
- How to minimise the likelihood of these hazards becoming a source of harm to themselves and others; and
- The location of safety equipment.

The employer is also required to inform employees of the results of any health and safety monitoring. In doing so, the privacy of individual employees must be protected.

EMPLOYERS TO INVOLVE EMPLOYEES IN THE DEVELOPMENT OF HEALTH AND SAFETY PROCEDURES

Employers need to ensure that all employees have the opportunity to be fully involved in the development of procedures for the purpose of identifying hazards and dealing with significant hazards, or dealing with or reacting to emergencies and imminent dangers (section 14).

TRAINING OF EMPLOYEES

The employer must ensure employees are either sufficiently experienced to do their work safely or are supervised by an experienced person. In addition, the employee must be adequately trained in the safe use of all plant, objects, substances and protective clothing and equipment that the employee may be required to use or handle (section 13).

SAFETY OF PEOPLE WHO ARE NOT EMPLOYEES

The employer is also responsible for health and safety of people who are not employees. An employer must take all practicable steps to ensure that an employee does not harm any other person

while at work, including members of the public or visitors to the place of work (section 15).

EMPLOYEES' DUTIES

If you are an employee, the Act gives you responsibility for your own safety and health while at work. You must also ensure that your actions do not harm anyone else.

SELF-EMPLOYED PEOPLE'S DUTIES

Every self-employed person shall take all practicable steps to ensure that no action or inaction of the self-employed person while at work harms the self-employed person or any other person.

However, these responsibilities do not detract from the employer's responsibilities.

ACCIDENTS AND SERIOUS HARM: RECORDS AND NOTIFICATION

The Act defines "accident" as an event that:

- Causes any person to be harmed; or
- In different circumstances, might have caused any person to be harmed.

This means that "accident" includes both near-misses and accidents that result in harm to a person or might have caused any person to be harmed.

Every employer is required to maintain a register

of accidents and serious harm, and record particulars relating to:

- Every accident that harmed (or, as the case may be, might have harmed):
 - Any employee at work; or
 - Any person in a place of work controlled by the employer; and
- Every occurrence of serious harm to an employee at work, or as a result of any hazard to which the employee was exposed while at work, in the employment of the employer.

Where there occurs any serious harm or accident an employer must:

- As soon as possible after its occurrence, notify the Secretary of Labour (in practice, the nearest OSH office) of the occurrence; and
- Within 7 days of the occurrence, give the Secretary of Labour written notice, in the prescribed form, of the circumstances. (Suitable forms for notification are available from OSH offices and selected stationers.)

The notification to the Secretary of Labour applies to:

- Every occurrence of serious harm to an employee at work, or the occurrence of serious harm as a result of any hazard to which the employee was exposed while at work, in the employment of the employer; and

- Accidents of a kind or description required by regulations.

The OSH office will advise whether it wishes to investigate the accident and what action may be taken in the meantime.

HEALTH AND SAFETY IN EMPLOYMENT REGULATIONS 1995

The regulations lay down duties of employers to provide and maintain facilities at the place of work and also duties relating to the managing of particular hazards in any place of work.

From a forestry work perspective, the main areas that are covered are:

- (a) Notification to OSH of logging operations and any tree felling.
- (b) Certain restrictions on working on heights above three metres.
- (c) Activities under raised objects.
- (d) Earthworks and excavations.
- (e) Harmful noise.
- (f) Cleaning, maintenance and repair of machinery.
- (g) The provision of protective structures for driver protection on most self-propelled mobile plant.
- (h) Duties of designers, manufacturers and

suppliers of plant and protective clothing and equipment.

- (i) Employment of young persons.

FURTHER INFORMATION

- Health and Safety in Employment Regulations 1995.
- *Guidelines for the Provision of Facilities and General Safety and Health in Forestry Work* (published by the Occupational Safety and Health Service, Department of Labour).

INTRODUCTION

The potential for accidents and serious injuries in tree maintenance work around power lines is very high as there are hazards from electricity as well as those connected with tree maintenance. Safety in your work is of the utmost importance to you, your family and your fellow workers.

Injuries have been reduced by the use of good safety rules in professions and industries the world over. Adopt a safe conduct attitude:

- Work with due consideration for your own and others' safety at all times.
- Carry out instructions properly.
- Ask when you are in doubt.
- Rectify or report all unsafe conditions.
- Report unsafe machinery and equipment.
- Use correct tools and equipment.
- Keep the workplace as tidy and organised as practicable.
- Have all injuries reported and attended to.
- Use only tools, machinery and equipment that you are authorised and trained to use.
- Do not start machinery unless authorised and until guards are in place and people aware.

- Wear and use protective clothing and equipment provided.
- Obey all safety rules and signs.

The rules contained in this code have been drawn up by practical people — experienced in all aspects of the industry, and these rules are well-proven ways of making your work safer.

Read them and make sure you understand them. If not, ask and make sure before you start the job. Follow the rules in this code and make sure others do too.

Remember: the life that's saved may be yours.

ABOUT THIS CODE

ORIGINS

The *Safety Code for Bush Undertakings* was originally published in 1960. Revisions were done as the industry expanded and changed. The code was subsequently divided into a number of parts to meet the rising complexity of operations and later renamed *Safety Code for Forest Operations*.

However, it was felt that there was sufficient demand to cover non-forestry type operations involving trees. An *Approved Code of Practice for Safety and Health in Tree Work — Part 1: Arboriculture* was produced with assistance from the aboricultural profession, and *Part 2: The Maintenance of Trees Around Power Lines* has been produced with strong support from power line operators and owners and those practitioners who carry out the work.

PURPOSE

This code describes recognised and preferred work practices for work on trees near power lines. It has been developed by a representative committee of power line operators and owners, people who carry out the work and government

departments, and is accepted as setting out the minimum standards of safety and safe work methods in this complex industry.

TERMINOLOGY

A number of conventions are followed in the terminology of this code which are intended to aid clarity.

Firstly, all specific recommendations are presented as numbered clauses within the booklet's numbered sections. Less specific background information that may be of use to the reader is usually included as unnumbered paragraphs at the beginning of each section or as appendices.

ACKNOWLEDGEMENT

The Occupational Safety and Health Service acknowledges the assistance given by people in the industry with the contents of this code. In particular, members of the working committee organised and led by mentor, Richard Young of Power New Zealand, are to be commended in the work they have done. It is hoped this code will provide practical guidance to workers and management alike, and that observance of the minimum work standards it sets out will achieve the desire of all concerned in making maintenance of trees around power lines a safe and rewarding occupation.

FURTHER INFORMATION

You can get further information on the occupational and safety aspects of forestry work from the nearest office of the Occupational Safety and Health Service. There are branches in each of the following centres, with the location of inspectors (Forest Operations) shown in **boldface** type:

Whangarei	Gisborne
Takapuna	Napier
West Auckland	Palmerston North
Penrose	Lower Hutt
Manukau	Wellington
Hamilton	Nelson
Rotorua	Christchurch
Tauranga	Dunedin
New Plymouth	Invercargill

DEFINITIONS FOR THE PURPOSE OF THIS CODE

Arborists' Code Part 1: *Code of Practice for Safety and Health in Tree Work — Part 1: Arboriculture* (available from OSH branch offices).

Auto reclosers: Protective switch gear which automatically relivens power lines after tripping out on a transient fault. (See also **Reclose block**.)

Close working: Work on any tree, where any part of that tree is within the close working zone (within Radius A) shown in Figure 1 of this code.

Competent worker: A worker who, through both training and on-the-job experience in accordance with section 3 of this code, is qualified to cut trees in close proximity to live overhead power lines in a safe and effective manner.

Conductor: Any overhead or underground electrical device, including communications wires and cables, power lines and other such facilities.

Contact: See **direct** or **indirect contact**.

Direct contact: Occurs when direct body contact

is made with a live conductor or some other live apparatus.

Earthed: At earth potential, and in the case of electrical equipment means earthed in accordance with the requirements of Regulation 30 of the Electricity Regulations 1993.

ECU 34: The *New Zealand Electrical Code of Practice for Electrical Safety Distances* (NZECP34: 1993).

Electrical hazard: An electrical hazard exists when a worker, a tool, or any conductive object enters the competent worker zone (within Radius B) shown in Figure 1 of this code.

EPV: An elevating platform vehicle or aerial lift where the height is adjustable by powered means (see also **Insulated EPV**).

Indirect contact: Contact is made when part of the body touches a conductive object in contact with a live electrical conductor. An indirect contact can be made through conductive tools, branches and equipment.

Insulated EPV: An EPV that has a current test certificate or label or is listed in a register as having a current test carried out according to Appendix 2.

Live: Any electrical equipment which has, or may have, a potential difference between it and earth. It includes equipment which is isolated and de-energised but not earthed.

Minimum approach distance: The closest distance which a specified object may approach a live power line. The distances for workers and equipment are set out in section 5.

Network operator: The person who or organisation which controls the supply of electricity to the power lines involved.

Network owner: The person or organisation who owns the power lines involved.

New Zealand Standards: Refer to Appendix 3.

Owner: Refers to the line owner. See **Network owner** above.

Reclose block: A means by which a network operator prevents protective switch gear from manually or automatically relivening power lines after tripping on a fault. (See also **Auto recloser**).

Service wires: The electrical cable or overhead conductors which are attached to the customers premises.

Shall: A mandatory requirement as used in this code.

Should: An advisory recommendation as used in this code.

Tree: Any vegetation, shrub, twig or branch.

1. GENERAL

1.1 SCOPE

This code of practice sets out the safety requirements for pruning, maintaining and removing trees and for cutting scrub in close proximity to electric live power lines. This code should be read in conjunction with The Arborists' Code Part 1 and the network operators' own code(s) of practice or operating standards.

1.2 PURPOSE

The purpose of this code is to provide safety information for tree workers and for members of the public. It is intended as a practical guide to any persons engaged in the above activities.

1.3 APPLICATION

This code is intended to apply to anyone engaged in the business, trade or performance of tree pruning, maintenance, removal or scrub cutting in close proximity to live power lines.

1.4 VARIATIONS

Variations to this code are acceptable provided that they are covered by written procedures

**approved and agreed upon by network operator,
network owner and tree worker.**

2. INTRODUCTION TO ELECTRICAL HAZARDS

2.1 GENERAL

Electrical and tree workers know that trees and live power lines are not compatible unless properly managed. When the two come into contact, trees can cause interruptions in service and require trimming. As a result, tree workers have to work near live power lines and electrocution resulting from accidental contact with live power lines is a serious threat.

If a tree is in contact with or has been in contact with a live conductor, burned or damaged leaves or branches may be visible at the contact points.

2.2 TREAT ALL POWER LINES AS LIVE

All overhead and underground power lines shall be considered to be live unless isolated and earthed.

2.3 LEGAL REQUIREMENT

There is a legal requirement to keep trees clear of power lines. An explanation of the safe distances which must be maintained between trees and power lines can be found in Trees (Electric Lines) Regulations 1986.

2.4 SAFE MINIMUM APPROACH DISTANCES

Workers trimming trees near power lines must observe the safe minimum approach distances shown in Figure 1 of this code and, in certain cases specified in this code, must obtain permission from the network operator and owner before commencing work.

2.5 ADVERSE WEATHER CONDITIONS

All procedures and minimum approach distances shown in this code apply to good weather and working conditions. Users of this code must be aware of the increased hazards posed by adverse weather conditions and take adequate precautions accordingly.

3. TRAINING

3.1 GENERAL

A competent worker in terms of this code is a worker whose qualifications, experience and ongoing training and assessment ensure competency in both arboriculture and electrical hazard awareness.

Specific training will comprise subjects relevant to both arborists and line mechanics.

3.2 MINIMUM REQUIREMENTS

- A proven safety record.
- A demonstrated degree of responsibility, conforming with rules and procedures and the ability to concentrate on critical tasks.

3.3 EMPLOYERS

Any employer employing any person to carry out work that comes within the scope of this code shall ensure that person has received the necessary training and experience and is competent to do that work. Records of every person's training and authorisation shall be kept by the employer.

3.4 PRINCIPAL TRAINING AND EDUCATION SUBJECTS

A competent worker shall be skilled in the following areas as appropriate to the work they are required to perform:

- Pruning, dismantling, felling and removal techniques.
- Machinery operation.
- Elevating platform operation.
- Recognition of electrical hazards (see "Definitions").
- Identification of circuits at different voltages.
- Minimum approach distances.
- Hazard awareness.
- Safe climbing techniques.
- Chainsaws — use and maintenance.
- Tree, EPV and pole top aerial rescue.
- First aid and cardio pulmonary resuscitation.
- Work site organisation.
- Signage and pedestrian/traffic control.
- Safety observer duties.
- Emergency procedures for fallen conductors, injuries, equipment failure, etc.
- Use and care of personal protective equipment.

3.5 ADDITIONAL TRAINING FOR CLOSE WORKING

Competent close workers are those who have, under the supervision of an appropriate instructor:

- (a) Passed examinations or practical assessment in those subjects listed above plus the following subjects:
 - Care, use and maintenance of insulated tools, ropes and equipment.
 - Situations where vegetation is caught up in conductors or where conductors fall.
 - Electrical safe working practices as they relate to the maintenance of trees within minimum approach distances.
- (b) Completed four practical exercises in different situations that demonstrate correct use of close working techniques. Three of those exercises must involve live high voltage overhead electric lines.

3.5.1 Ongoing competency of close workers

Workers carrying out close work shall, to remain competent in a given work procedure, have satisfactorily completed that procedure at least three times during a calendar year.

3.5.2 Instructors

An instructor should be one or more of the following:

- (a) Recognised by the Ministry of Commerce as a live line instructor; and/or
- (b) A competent close worker with at least 3 years' continuous experience in close working; and/or
- (c) As otherwise agreed upon between a tree worker employer and line owner/operator.

3.6 REFRESHER TRAINING

Regular renewal and updating of certain aspects of training is required to ensure continuing competency. Workers shall attend refresher courses in the following subjects at intervals not exceeding 12 months:

- Hazard awareness.
- Recognition of electrical hazards.
- Identification of circuits at different voltages.
- Minimum approach distances.
- First aid and cardio pulmonary resuscitation.
- Use and care of personal protective equipment.
- Electrical safe working practices as they relate to the maintenance of trees within minimum approach distances.
- Safe pruning and felling techniques.

4. GENERAL SAFETY

4.1 GENERAL

- 4.1.1** A small cutting may be allowed to fall between conductors provided its diameter is less than 75 mm and its length less than half the distance between conductors.
- 4.1.2** Where any part of a tree falls towards a live power line, no attempt shall be made to stop it falling.
- 4.1.3** Safety equipment and devices shall conform with all statutory requirements and other applicable standards and codes. They shall conform with any particular requirements of this code and shall be maintained in a safe condition.
- 4.1.4** Employers shall instruct their employees in the provisions of this code, the proper use of all equipment provided for them and the safe working practices to be followed.
- 4.1.5** Hazard identification and a full discussion of working methods shall be carried out carefully before any tree work is done.
- 4.1.6** All equipment upon which the worker relies for their safety, shall be inspected by the worker each day before use.
- 4.1.7** All vehicles and equipment shall be equipped and operated in compliance with this code, applicable

laws and regulations and with manufacturers' operating instructions.

- 4.1.8 Workers should be familiar with the information about electrical hazards contained in Appendix 1.
- 4.1.9 Adequate light shall be available for any tree work.

4.2 PROTECTIVE CLOTHING

- 4.2.1 Personal protective clothing and equipment shall be worn and used as appropriate
- 4.2.2 All personal protective equipment shall, where applicable, conform to NZ Standards or equivalent or better. Appropriate NZ Standards are listed in Appendix 3.
- 4.2.3 Head protection shall be worn at all times by workers. The worker shall not rely on the helmet for protection from electric shocks.
- 4.2.4 Footwear having moulded non-conductive soles, steel toe caps and providing ankle support should be worn.
- 4.2.5 All workers using chainsaws shall wear safety leg protection.
- 4.2.6 Workers shall not work in proximity to live power lines with their arms, legs or body exposed. Cotton drill or cotton-rich blended materials should be worn as these give some protection against accidental contact and electrical burns from arcing power lines.

4.2.7 Hearing protection is essential to workers working in areas subject to harmful noise, that is with a constant noise level in excess of 85 dB(A). All chainsaw and brushwood chipper workers and those nearby shall wear at least Grade 4 hearing protection. Refer to the Arborists' Code Part 1.

4.2.8 All climbing workers and climbing equipment shall comply with the Arborists' Code Part 1, section 25 to 31 "Climbing and Climbing Equipment".

4.3 FIRST AID

A first aid kit adequately stocked and maintained shall be available when and where operations are being carried out. Each worker shall be instructed in its use. The kit shall at least conform to the Arborists' Code Part 1.

4.4 RESCUE

Rescue procedures for workers working above ground shall be established by the employer and the workers trained accordingly. This shall include elevating platform vehicle rescue where EPVs are being used.

4.5 TRAFFIC CONTROL

Effective means for control of pedestrian and vehicular traffic shall be implemented on every site where necessary. Traffic control measures

shall conform to the Transit New Zealand handbook *Working on the Road* and the requirements of the local roading authority or council.

4.6 FIRE PROTECTION

The requirements of the law and local enforcing authorities shall be complied with in providing the necessary fire protection for tree operations. For additional information, refer to the Arborists' Code Part 1.

- 4.6.1** When working in special areas, for example dry forests, Department of Conservation areas, reserves, etc., fire authority requirements shall be followed.
- 4.6.2** Petroleum-powered equipment shall be refuelled only after it has been stopped. Any spilled fuel shall be removed from the equipment before restarting.
- 4.6.3** Flammable liquids shall be stored, handled and dispensed only from metal containers or approved safety cans.
- 4.6.4** Smoking shall be prohibited when handling or working around any flammable liquid.

5. MINIMUM APPROACH DISTANCES

- 5.1** All workers shall observe the minimum approach distances from live power lines shown in Figure 1. The minimum approach distances are the minimum distances under ideal environmental, weather and working conditions.
- 5.2** Allowance must be made for the effects of temperature, wind and other environmental influences on conductor sag and swing while working on trees in proximity to live conductors. In practice, this means that extra safety clearance should be allowed towards centre span to ensure that minimum approach distances are maintained at all times.
- 5.3** Only persons who are competent in terms of this code shall work on any part of a tree which encroaches or which may encroach during work, the competent worker zone (Radius 'B') in Figure 1.
- 5.4** All work in the competent worker zone shall only be carried out with the permission of the network operator and owner and using written procedures approved by the network operator and owner.

- 5.5 Only persons who are competent in terms of this code and are competent in close work as specified in section 3.4 may work on any tree or part of a tree, which is within or which may enter the close working zone (Radius 'A') in Figure 1.
- 5.6 Only insulated tools and insulating rope, suitable for the purpose, shall be used for work on any tree, or part of a tree which is within or which may enter the close working zone (Radius A) in Figure 1.
- 5.7 The minimum approach distance represented by Radius 'A' in Figure 1 shall never be encroached by an EPV or other machinery, any conductive tool or any part of the body.
- 5.8 No EPV or other machinery shall approach closer than 4 metres to any power line except with the written permission of the network operator and owner (refer Regulation 82 (3) of the Electricity Regulations 1993).
- 5.9 Given written permission as per section 5.8 no EPV shall approach closer to any live conductor than the following distances (unless used in accordance with 5.11).

Nominal Line Voltage	Metres
Not exceeding 1000 volts	1.0
Exceeding 1000 volts but not exceeding 22 kV	1.5
Exceeding 22 kV but not exceeding 33 kV	2.0
Exceeding 33 kV	4.0

(Refer NZ Electrical Code of Practice No. 34 Table 8)

- 5.10** Given written permission as in section 5.8, an insulated EPV used in accordance with section 9 (close work) may work up to the minimum approach distance Radius 'A' in Figure 1.
- 5.11** To assist tree workers to judge the boundary of the competent worker zone represented by the 45° angles, it should be noted that (after allowing the necessary horizontal clearance of Radius 'B') each metre stepped out horizontally corresponds to a metre vertical rise in the boundary line.
- 5.12** Allowance should be made while working on steep slopes or in areas where the background lighting or other factors could cause a tree to appear further away from a line than it is. If in doubt, measurements shall be taken.

6. USE OF TOOLS AND EQUIPMENT

6.1 ELEVATING PLATFORM VEHICLES (EPVs)

- 6.1.1** All EPVs used for work coming within the scope of this code shall conform to and be used in accordance with the requirements of the OSH publication *Approved Code of Practice for Power-Operated Elevating Work Platforms*.
- 6.1.2** Buckets, platforms or booms of EPV equipment shall be provided with an approved means of anchorage to which a safety harness or lanyard can be secured. Safety harnesses shall be worn at all times the worker is inside the bucket. Harnesses shall have a maximum fall distance of 1.5 metres so as to prevent fall injuries.
- 6.1.3** Holes shall not be drilled in EPV buckets unless the holes are necessary for fittings or attachments and it can be shown that the holes do not affect the electrical insulation level or the mechanical integrity of the bucket.
- 6.1.4** Where an EPV or any other mobile plant is required to be operated at distances closer than 4 metres from power lines, the requirements of

paragraphs 5.9 and 5.10 of this code shall be complied with.

- (a) The written permission of the network operator/owner shall be obtained where an EPV is to be used at distances less than 4 metres from a power line.
 - (b) Where a network owner/operator gives permission to use an EPV or mobile plant at distances set out in paragraphs 5.9 and 5.10 of this code, that permission should only be given upon receiving written confirmation that the work will be carried out in accordance with this code.
 - (c) EPVs shall display a safety label reminding the EPV operator of the requirement to obtain permission from the network owner and/or operator to approach closer than 4 metres from power lines.
- 6.1.5** EPVs shall have their wheels chocked and outriggers or torsion bars correctly positioned before being used.
- 6.1.6** EPVs shall not be used as a crane or hoist to lift and lower materials unless specifically designed to perform such operations.
- 6.1.7** While using an EPV, the operator shall look in the direction of travel of the bucket and be aware of the boom in relation to other objects and hazards.
- 6.1.8** Where EPV booms are operated over roads, safe

clearances shall be maintained or traffic control be provided with the Transit New Zealand handbook *Working on the Road*.

- 6.1.9** A one-man bucket shall not have more than one worker riding in it.
- (a) Booms or buckets shall not be run into live power lines, cables, poles, trees or other similar objects.
 - (b) Electric leads (for portable electrical appliances) and electrically conductive hoses and pipes shall not be run from the truck or the ground to the bucket of the EPV.
 - (c) Provided they have an insulated upper boom, EPVs may be used over conductors, but at no time closer than the minimum approach distances.
 - (d) All EPVs shall be fitted with non-metallic buckets.
 - (e) A chainsaw shall not be started from inside a bucket or platform unless:
 - (i) A fixed starting bracket is fitted to the bucket walls or platform guard-rails so that the bar and chain are outside the working area when the chain is started; or
 - (ii) The saw is warmed up on the ground and then, with the chain break on, re-start outside the bucket holding with a straight right arm and starting

with short sharp pulls on the starter cord.

6.2 ROPES

- 6.2.1 All ropes shall be used in accordance with the requirements of section 27 of the Arborists' Code Part 1.
- 6.2.2 Wire ropes and strops shall not be used within 4 metres of an overhead electric line without the permission of the owner and operator of the line.
- 6.2.3 Care shall be taken to ensure climbing ropes are controlled when placing over an ascending crotch so accidental contact with power lines is avoided.
- 6.2.4 Ropes shall always be directed away from the power line or controlled to prevent the tail end from swinging towards the power line.

6.3 LADDERS

- 6.3.1 Only wooden ladders, complying with NZS 3609: 1978 *Specification for timber ladders* Amendment 1984, or non-conductive ladders made of a material with a strength the equal to or better than wooden ladders to the standards shall be used except as outlined in 6.3.3 below.
- 6.3.2 Ladders shall be maintained and used in accordance with the requirements of section 30 of the Arborists' Code Part 1.
- 6.3.3 Metal or aluminium self-supporting tree ladders

complying with NZS 5233: 1986 *Specification for portable ladders (other than timber ladders)* 1991 may be used when working close to covered conductors of voltages 400 volts and below — **only if used with insulated gloves and tools.**

6.4 SAFETY HARNESES

- 6.4.1 All harnesses shall comply with or be at least equivalent to NZS 5811: 1981 or AS 1891: 1983 *Industrial safety belts and harnesses*.
- 6.4.2 All harnesses shall be used and maintained in accordance with the manufacturers' instructions and section 28 the Arborists' Code Part 1.
- 6.4.3 Safety strops attached to climbing harnesses shall not be made of or contain metal.

6.5 PRUNING TOOLS

- 6.5.1 All pruning tools shall be maintained and used in accordance with the manufacturers' operating instructions and the Arborists' Code Part 1.
- 6.5.2 Pole pruners and pole saws shall be hung in a vertical position away from power lines. Pole pruners and pole saws shall not be hung on power lines or cable.

7. WORK METHODS WITHIN THE "ANY TREE WORKER ZONE "

(As defined in Figure 1.)

This section sets out the minimum requirements that shall be observed when carrying out work on any tree that is in the “any tree worker zone” but no part of that tree is in the “competent worker zone” (shown in Figure 1 of this code).

- 7.1 All work should be done in accordance with the Arborists' Code Part 1.

8. WORK METHODS WITHIN THE "COMPETENT WORKER ZONE"

(As defined in Figure 1.)

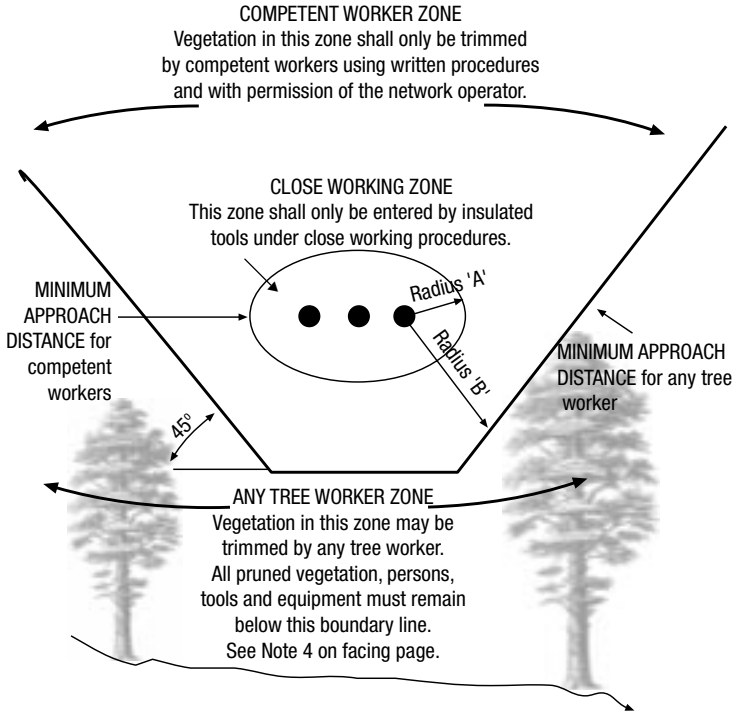
This section sets out the requirements that shall be observed when carrying out work on any tree that is within the “competent worker zone” but no part of that tree is within the “close working zone” shown in Figure 1 of this code.

Note: Where the tree is within the “competent worker zone” **and** the “close working zone:”, the work is defined as “close work” and the requirements of section 9 **as well as** this section shall be observed.

8.1 GENERAL

- 8.1.1 Vegetation in this zone shall only be trimmed by competent workers using written procedures and with the permission of the network operator.
- 8.1.2 All work should be done in accordance with the Arborists' Code Part 1.

Figure 1. Minimum approach distances for tree workers



	MINIMUM APPROACH DISTANCES	
	COMPETENT WORKER	ANY TREE WORKER
Voltage of line	Radius 'A'	Radius 'B'
230/400V	0.15 m	0.5 m
11,000V	0.6 m	1.5 m
33,000V	0.7 m	2.5 m
66,000V	1.0 m	3.0 m
110,000V	1.5 m	4.0 m
220,000V	2.2 m	6.0 m

NOTES:

1. Refer to section 5 for full explanation of this figure.
2. Allow for environmental effects of wind and temperature on conductor swing and sag.
3. Any tree felling must be in a direction away from power lines.
4. If any part of a tree may enter the close working zone during trimming, close working procedures shall be used on all parts of that tree.
5. No EPV or other machinery shall approach closer than 4 metres to any power line without the written permission of the network operator, and then, no uninsulated EPV or other uninsulated machinery shall approach closer to any live conductor than the distances specified in Table 8 of the *NZ Electrical Code of Practice 34*.

8.1.3 Emergencies

When, during tree operations, an emergency condition develops that involves live electrical power lines, (such as a tree making contact with or falling towards a live power line) work shall be suspended and the network operator shall be notified immediately. Work shall not resume until the emergency condition has been eliminated and this is confirmed by the network operator.

8.1.4 Competent Workers

- (a) There shall be at least one competent worker at the work site at all times. Any trainee or non-competent worker shall be under the direct supervision of a competent worker.
- (b) The competent worker shall be within normal voice communication of any worker during the duration of the work.

8.2 BEFORE STARTING WORK

8.2.1 Job Briefing

A job briefing session shall be held at which an explanation of the following is included:

- WHY the work is to be done.
- WHAT is to be accomplished.
- HOW the work is to be carried out.

- WHO will do it.
- WHAT hazard control will be implemented.

The briefing shall address factors which may affect the safety and progress of the work such as:

- The voltage or voltages of the lines to which the trees are in close proximity.
- The minimum approach distances for those voltages, as shown in Figure 1 of this code.

8.2.2 Communications

A reliable on-site two-way communication link shall be established and maintained with the network operator.

8.2.3 Permission

The network operator's permission shall be sought for the work to be carried out.

8.2.4 Hazard identification

An inspection shall be made by a competent worker to determine the hazards that exist before climbing, or otherwise entering or performing any work on trees.

8.2.5 Minimum approach distances

The competent worker shall determine the minimum approach distances to be observed, in accordance with section 5 of this code. At no time shall the minimum approach distance be less than that represented by Radius "A" in figure 1.

8.3 DURING WORK

8.3.1 Minimum approach distances

The minimum approach distances as determined by a competent worker under paragraph 8.2.5 above shall be observed at all times.

8.3.2 Safe climbing, pruning and felling procedures

- (a) Pruning practices shall be in accordance with sections 32 to 35 "Tree Pruning" of the Arborists' Code Part 1.
- (b) Tree climbing shall be undertaken in accordance with sections 25 to 31 "Climbing and Climbing Equipment" of the Arborists' Code Part 1.
- (c) Workers engaged in tree climbing shall be fully conversant with proper climbing techniques and shall use only purpose-made climbing equipment.
- (d) While climbing, the position of the live power lines should be noted and the climber should climb on the side of the tree that is away from the lines, while always maintaining at least the minimum approach distance.
- (e) A separate line shall be attached to limbs that cannot be safely controlled by a climber. The line should be controlled by workers on the ground end of the rope. Use of the same

crotch for both the safety rope and the lowering rope should be avoided.

- (f) Workers pruning trees, working from ropes inside a tree or from an EPV shall:
- Adequately control branches or limbs with the use of ropes, **prior to commencing cutting;**
 - Support branches and limbs such that during any cutting or removing, they will **move away** from any live power line;
 - However, be allowed to let a small cutting fall between the conductors providing that its diameter is less than 75 mm and its length less than half the distance between the conductors;
 - Fully control any branch or limb which may spring up and create hazardous conditions.
- (g) Branches or limbs extending over conductors must be fully secured before being cut or trimmed to prevent them falling on conductors.
- (h) Where any part of a tree falls towards a live power line, no attempt shall be made to stop it falling.
- (i) Where any part of a tree is making contact with or resting on live power lines, **work must immediately stop** and either:

- The network operator contacted so the work can be carried out with the line de-energised; or
 - Arrangements are made to have the work carried out in accordance with the requirements of section 9 of this code.
- (j) Where any part of a tree cannot be controlled, such that it will move away from the line, **work must immediately stop** and one of the following options shall be used:
- Work methods are changed so the tree is dismantled in such a way that no contact with a live power line is possible; or
 - The network operator is contacted so the work can be carried out with the line de-energised; or
 - Arrangements are made to have the work carried out in accordance with the requirements of section 9 of this code.
- (k) Tree felling shall be in accordance with sections 36 to 42 of the Arborists' Code Part 1.

8.3.3 Weather conditions

- (a) Work shall not be carried out in weather conditions that prevent absolute control of the branches or limbs being pruned.
- (b) When there is an electrical storm in the area, workers aloft shall cease work, descend to

ground level and keep clear until the danger has passed.

- (c) Work around live power lines shall not be carried out if rain commences and absolute control cannot be maintained. Workers aloft shall cease work, descend to ground level and keep clear until the rain has stopped.

9. WORK METHODS IN THE "CLOSE WORKING ZONE"

(As defined in Figure 1.)

This section sets out the additional requirements that shall be observed when carrying out close work, i.e. work on any tree that is within both the "competent worker zone" and the "close working zone".

All other requirements of this code shall also be complied with.

Where the requirements of this subsection differ from any other requirement in this code, the requirements of this section shall take precedence.

GENERAL

9.1 WORK MANUAL

Appendix 2 "Close Working Standards" shall be complied with.

9.2 EQUIPMENT, VEHICLE AND WORK STANDARDS

A manual shall be made available at each worksite. This manual shall contain at least the following:

- 9.2.1** A description of close working principles and requirements.
- 9.2.2** A description of each tool, its functions and uses.
- 9.2.3** Instructions on caring for the tools and equipment including:
 - Daily checks
 - Inspections
 - Maintenance instructions
 - Testing requirements for plant and equipment
 - Storage of plant and equipment.
- 9.2.4** A set of approved work procedures.
- 9.2.5** Information for use in an emergency such as a situation requiring cardio pulmonary resuscitation (CPR) and rescue from an EPV, ladder or tree.

9.3 ELECTRICAL PROTECTION AND ELECTRICAL RECLOSE BLOCKS

An administrative procedure for a reclose block shall be established to enable the following guarantees to be received from a network operator.

- 9.3.1** That a reclose block has been applied to the section of the line near which close work is to be

carried out and will remain applied for the duration of the work.

- 9.3.2** Protective devices are operational on that section of line and will remain operational for the duration of the work.

9.4 CONTROL OF WORK AREA

Where the public have access to any operation, sufficient area around the tree shall be designated the work area (including EPV being used) and be marked prior to starting work by the erection of warning signs, barricading, roping or some other effective method. (If a part of a tree contacts a live power line, "step" and "touch" potentials may be created around the base of the tree.)

9.5 INSULATED TOOLS AND EQUIPMENT

Only insulated equipment, insulated tools and insulated rope that comply with the provisions of Appendix 2, that have a current test certificate or label or are listed in a register as having a current test, shall be used.

9.6 COMPETENT WORKERS

- 9.6.1** There shall be at least two competent workers at the worksite at all times. One person should remain on the ground at all times.
- 9.6.2** Any worker at the worksite shall be within normal voice communication of a competent worker, for the duration of the work.

9.7 BEFORE COMMENCING WORK

9.7.1 Tool insulation distance

- (a) The tool insulation distance shall be determined by a competent worker. The competent worker shall ensure that the tool manufacturers' insulation rating complies with ASTM: F711 and ANSI/IEEE: 978 standards.
- (b) Marks that do not reduce or damage the tools' insulation qualities shall be placed on the insulated stick in such a position as to ensure that the minimum approach distances in Radius "A" (Figure 1) and tool insulation distances are not infringed.

9.7.2 Auto-reclosers and protection

- (a) A competent worker shall request the network operator to disable the auto-reclose equipment controlling the section of the line near which close work is to be carried out.
- (b) The auto-reclose equipment shall be disabled for the duration of the work.
- (c) The network operator shall give the competent worker confirmation that:
 - The auto-reclose equipment shall remain disabled for the duration of the work;
 - The reclosing equipment shall be tagged out of service with an appropriate safety

tag and, where possible, locked;

- Protective devices are operational on that section of line and will remain operational for the duration of the work.
- That the status of clause 9.7.2 (b) will not change until an assurance has been received from the competent worker that:
 - The close work has been completed and the worksite is safe.
 - All workers, equipment, tools and vehicles are safely clear of the line.

9.8 DURING WORK

9.8.1 Approved work procedure

All close work shall be done in accordance with an approved work procedure (as defined in Appendix 2) with the permission of the network operator and owner.

9.8.2 Tools and equipment

- (a) Only tools and equipment that are in a clean and dry condition shall be used.
- (b) Tools and rope shall not be laid directly on the ground.
- (c) All equipment and insulating tools shall be visually inspected and cleaned before use. Any tool that appears to be defective, shall be

withdrawn from service for further inspection, testing, repair and/or replacement.

- (d) All insulating equipment shall be kept clear of oils, greases, oil-based hand cream, oil-based sunburn cream or any other oil-based substance.

9.8.3 Tool insulation distances

The tool insulation distances, as determined by a competent worker under paragraph 9.7.1, shall be observed at all times by any worker using an insulated tool.

9.8.4 Safe climbing and pruning procedures

- (a) Where possible, trees shall be pulled clear of live conductors before being cut.
- (b) A cutting from a tree may be moved towards a live line provided the minimum approach distances are maintained between the cut section, the tree and the conductors.
- (c) A small cutting may be allowed to fall between conductors providing its diameter is less than 75 mm and its length is less than half the distance between the conductors.
- (d) If any worker is required to handle rope during work inside the close working zone, then this rope shall be insulated rope. (See Appendix 2, section 2.5.)

9.8.5 Communications

Where communication with the network operator is lost or cannot be confirmed, work shall cease until communication is firmly established. In the case of areas in which media communications is difficult or impractical, specific alternative arrangements must be agreed by the network operator.

APPENDIX 1: ELECTRICAL KNOWLEDGE

1. INTRODUCTION

Electrical and tree workers know that trees and power lines are not compatible unless properly managed. When the two come into contact trees can cause interruptions in service and require trimming. As a result, tree workers have to work near live power lines, and electrocution resulting from accidental contact with live power lines is a serious threat.

There are many variables associated with the hazards of electricity that must be understood before working near power lines. Never work near any electrical conductor unless you are sure that the job can be completed safely.

2. ELECTRICAL SYSTEMS IN NEW ZEALAND

Electricity is generated from many sources: hydroelectric dams, natural gas, coal, geothermal steam, oil and wind power. Once generated, electricity is transmitted at high voltage to substations, where the voltage is lowered by transformers for distribution to customers.

The transmission lines within each island of New Zealand connect the generating sources to the bulk supply substations either at 220,000 or 110,000 volts. Generating sources in each island are further connected together through a high voltage direct current (HVDC) link across Cook Strait.

Distribution lines carry electricity between the bulk supply substations and other smaller, load-centred substations. These lines usually operate at 66,000, 33,000 or 11,000 volts. The voltage is further transformed at these load centre substations for distribution to customers, usually at 400 or 230 volts.

3. ELECTRICAL TERMS

There are three measurements of electricity that are commonly referred to:

- **Voltage** is the measurement of electrical pressure. Voltage causes electricity to flow through a conductor in a similar way that water pressure forces water through the hose. It is often expressed in units of 1,000 volts or kV. The "k" means kilo and the "V" means volts. An 11,000 volt conductor is often called an 11kV conductor.
- **Current** is the flow rate of electricity, measured in **amps**. Amps measure electricity in the same way that litres per minute measure the flow of water. The flow in an ordinary house service line is highly variable, depending on the draw of the electrical appliances operating within the

premises at a given moment. The current within a house is usually less than 40 amps, while the current in distribution lines may be up to 300 amps under normal conditions. Under fault conditions where current flows directly between power line conductors, between 5,000 and 10,000 amps are possible.

An electric current can only occur when an electrical circuit is completed. A conductive path created between two conductors, or between one live conductor and ground fuses results in a flow of electric current. The circuit created is called a "phase to phase" or "phase to earth" circuit respectively.

- **Resistance** is measured in **ohms** and describes a material's resistance to electric current. Copper wire has low resistance and is therefore a good **conductor**. Water is another good conductor of electricity. The human body is mainly water and therefore is a good conductor, which is why extreme care is necessary when working anywhere near live power lines. A tree also has a high water content and can be a good conductor of electricity.

Poor conductors, such as porcelain, have **high** resistance and are used as **insulators**.

4. HOW SHOCKS OCCUR

Electric current normally travels from the power source,

along power lines, to the load. However, electric current will change its course if another path of low resistance such as a **tree or person** is available.

If a person becomes the link completing the circuit between a power line and a tree, an electric shock will occur, and injury or death will result.

An electric current will flow and an electric shock will occur if a person contacts a live power line (or a live tree or tool) and simultaneously contacts a path to ground or another power line. The current enters the body at one contact point, flows through the body and leaves at another contact point (usually a path to ground). A tree, a power pole, a guy wire, an uninsulated truck boom or any other conductive object can be the fatal path to ground.

Note that for current to flow, actual physical contact between the body and a conductor may not be necessary. Electricity has the potential to jump (arc) a distance which increases with rising voltage. The greater the voltage, the greater the hazard to workers. Greater voltages require greater clearances to be maintained between power lines and workers.

A tree which is in contact with live power lines can cause an electric shock to a worker touching or climbing the tree, even at ground level. The current which flows through the tree to ground raises the voltage of the tree and can result in a shock to a person touching the tree. The voltages induced in the tree and around the tree are known as "step" and "touch" potentials.

Types of contact

Direct contact is made when part of the body contacts a live electrical conductor.

Indirect contact is made when part of the body touches a conductive object in contact with a live electrical conductor. An indirect contact can be made through conductive tools, branches and equipment.

Both direct and indirect contact will result in an electric shock if the body helps to create a path between conductors or between a conductor and ground.

5. THE EFFECTS OF ELECTRIC SHOCK

The effect of an electric shock on an individual depends on the circuit voltage, the pathway through the body and the duration of the contact. Even contact with house voltage can be fatal. Most electrical fatalities and injuries are caused by 230 volts. A current of as little as one tenth of an amp can cause the heart to go into a spasm which could be fatal.

An electric shock produced by contact with a power line passing through an average adult body from hand to foot for one second can have varying effects depending on current flow. Starting from a barely perceptible condition at 1 milliampere (one thousandth of an amp) an electric shock can cause involuntary muscular contractions from 9 to 25 milliamps. Higher currents from 75 milliamps to 4 amps can result in ventricular fibrillation (heart spasms) and immediate cardiac arrest (heart stoppage) at over 4 amps. Nearly instantaneous death can result from

cardiac arrest as well as direct paralysis of the respiratory system at 20 milliamps or more.

Even when the shock current does not pass through vital organs or nerve centres, severe injuries can still occur. In some cases, tissue damage resulting from deep internal burns can contribute to a delayed fatality.

Secondary injuries may occur when low current shocks cause involuntary contractions that result in falls, collisions and other accidents. These types of accidents have caused injuries ranging from bruises and bone fractures to death.

6. SHORT CIRCUITS

In addition to the shock hazard, electricity can pose serious health hazards through explosive arcs. A 22 kV line is capable of releasing the same energy as a 747 jumbo jet with engines under full power.

When a short circuit occurs between live power lines, as happens when a conductive object touches two live power lines simultaneously, the resultant current is very dangerous. High temperature arcs can cause severe burns, vision damage, start fires and damage equipment, sending fragmented metal flying in all directions.

7. RECOGNISING VOLTAGES

Tree workers shall ensure that they positively identify the voltage of power lines and then work to appropriate safety clearances. The power line owner or operator shall be consulted to verify the voltages.

In general, the highest voltage power lines are found at the top of the power pole while lower voltage lines are installed at lower heights. Typically, telephone wires are in the lowest position on a pole.

Larger insulators, taller poles or structures and greater conductor separation are all indicators of higher voltage.

APPENDIX 2:

CLOSE WORKING

1. APPROVED WORK PROCEDURE

1.1 Development and proving

Work procedures shall be developed, documented and approved for all close work. These procedures shall be proven in a trial on a de-energised line to the satisfaction of a suitably experienced and qualified person or persons to verify that they can be carried out reliably and safely.

1.2 Documentation

Documentation clearly setting out the basic steps shall be provided for each approved work procedure.

In addition each work procedure shall:

- Clearly identify the objectives of the work procedure.
- List the minimum tools and equipment required for the task and clearly state the maximum loading conditions for these tools if applicable.

- Have unique document identification numbers and show amendment or issue numbers and date of issue.
- State the minimum number of workers required.

A copy of the relevant approved work procedure, shall be readily available at the work site.

1.3 Compliance with approved work procedures

Approved work procedures shall not be changed or disregarded on site, except for minor changes that do not alter the basic structure of the procedure, do not reduce minimum approach distances and do not compromise safety requirements in any way.

2. EQUIPMENT

2.1 General

A person suitably experienced and qualified in live line work shall be satisfied that:

- All equipment is suitable for close work and is safe to use by any worker;
- The equipment meets the appropriate standard listed in 2.2.2;
- All cleaning agents used to clean any tool or equipment, are suitable for the purpose and safe for any worker to use.

2.1.2 A tool management and maintenance system shall be in place to ensure that equipment is maintained to appropriate standards, and that records of purchase, inspection, maintenance and testing are kept.

2.2 Reference documents

2.2.1 Until Australian Standards (AS), New Zealand Standards (NZS) or joint Australia/New Zealand Standards (AS/NZS) are developed, equipment used for close work shall comply with standards issued by ASTM (the American Society for Testing and Materials) and ANSI (American National Standards Institute).

2.2.2 The Standards are:

- ASTM: F711 *Specifications for Fibreglass-Reinforced PLastic (FRP) Rod and Tube.*
- ANSI/IEEE: 978 *Guide for In-Service Maintenance and Testing.*
- ANSI/SIA A92.2 *Vehicle-Mounted Elevating and Rotating Aerial Devices.*

2.3 Acceptance Testing

- (a) All insulating tools and equipment shall meet the requirements of the relevant standard.
- (b) Each item of insulating equipment shall have a unique identification marked on it, and:

- be provided with a test certificate or a label; or
 - be noted in a register that it has passed the relevant test and the date when it is due for a retest.
- (c) All live line insulating equipment shall be submitted for tests at an electrical testing facility approved by the employer.

2.4 Elevating platform vehicles (EPVs)

- (a) If the user of the EPV or the line owner decides that added electrical secondary protection is required, it is recommended as a minimum that the EPV be tested to ANSI/SIA A92.2 *Vehicle Mounted Elevating and Rotating Aerial Devices*. Category C Table 2 shows that the minimum test criteria for *Aerial Ladders and Insulating Vertical Aerial Towers* will be acceptable as secondary insulation for close work using hot sticks having due regard for the voltage of the line in close proximity to the work.

Since the methods employed and insulated tools used are compatible with hot stick live-line work, EPV selection should comply with the criteria in ANSI/SIA A92.2 Appendix C. If the EPV or any part of it is to be used within the distance specified in Table 8 of NZECP 34, as a minimum the EPV is to be

insulated and tested to comply with ANSI/SIA A92.2 Category C having due regard to the voltage of the line in close proximity to the work.

- (b) Hydraulic tools may be connected to the hydraulic tool circuit at the top of the EPV. The hoses connecting those tools to the tool circuit and the oil used shall be electrically non-conducting, tested and approved.

2.5 Insulating rope

Insulating rope shall be of synthetic material with insulating and other properties which meet ANSI/IEEE Standard 516 *Guide for maintenance methods on energised power lines*.

Test samples shall be taken from the end of each reel of rope before issue and shall be tested before issue. This includes insulating rope that is proposed to be used in any material handling device.

2.6 Ladders

Ladders shall be either the insulated type or reinforced. Where reinforced ladders are used they shall be either:

- A fibreglass reinforced rod type; or
- A wire reinforced type with the reinforcing wire effectively insulated with insulating material.

2.7 Care and use of tools and equipment

Equipment shall be stored and transported in moisture- and dust-resistant containers or transporters. The transportation containers should be constructed so that the tools are held firmly in place to prevent surface abrasion or other damage to the tools. Care shall be taken to ensure these containers are well ventilated to avoid moisture effects due to excess humidity or condensation.

2.8 Routine testing

(a) General

- (i) All insulating equipment, tools and vehicles shall be tested in accordance with the relevant standard, at regular intervals.
- (ii) Before testing, each item of equipment, tool or vehicle shall be cleaned in accordance with the manufacturer's recommendations or the requirements of the employer.
- (iii) The testing intervals are as follows:

Equipment	Standard	Frequency
EPVs	ANSI/SIA A92.2	6 months
Insulated Tools	ASTM: 711	12 months
Insulating Rope	ANSI/IEEE 516	6 months

(b) Insulated Tools

Tools shall be inspected prior to use for signs of overstressing. This type of damage is evident by distorted or cracked parts, bent rivets or bolts.

Metal parts shall be checked for excessive wear and other visible damage.

(c) Insulated Elevating Platform Vehicles

Prior to use, all insulating sections of an EPV shall be visually inspected and wiped clean as necessary.

The insulating qualities of an EPV shall not be reduced by the use of conducting hydraulic hoses or oil.

(d) Insulating Rope

Insulating rope used for live work shall not be used for any other purpose.

Any time insulating rope is suspect, it shall be withdrawn from service, washed and tested before re-use.

APPENDIX 3: NEW ZEALAND LAWS AND STANDARDS REFERRED TO IN THIS CODE

This code is intended to be used with the following:

Note: Should any of the following be updated and superseded, the latest version is to take precedence. It is the user's responsibility to ensure the correct version is referred to.

NEW ZEALAND STATUTES

- The Electricity Act 1992 and the Electricity Regulations 1993.
- The Resource Management Act 1991.
- The Health and Safety in Employment Act 1992.
- Health and Safety in Employment Regulations 1995.
- Trees (Electric Lines) Regulations 1986.

NEW ZEALAND STANDARDS (APPLICABLE TO SAFETY EQUIPMENT AND CLOTHING)

This list of standards is given as a guide. Any other reputable Standards which embodies the same or more stringent criteria will be accepted as an alternative to those listed.

- NZS 5806: 1980 *Specification for industrial helmets (medium protection).*
- AS/NZS 1715: 1994 *Selection, use and maintenance of respiratory protective devices.*
- AS/NZS 1337: 1992 *Eye protectors for industrial application.* Amendment 1, 1994.
- AS/NZS 2210 *Occupational protective footwear.*
AS/NZS 2210.1: 1994 *Guide to selection, care and use.*
AS/NZS 2210.2: 1994 *Specification.* Amendment 1, 1995.
- AS/NZS 1891.1: 1995 *Safety belts and harnesses.*
- AS/NZS 1891.3: 1992 *Fall arrest devices.*
- NZS 5827: 1988 *Industrial overalls.*
- NZS 5840: 1988 *Specification for protective legwear for chainsaw users.* Corrigendum 1, 1989.
Amendment 1, 1993
- NZS 3609: 1978 *Specification for timber ladders.* Amendment 1: 1984.
- NZS 5233: 1986 *Specification for portable ladders (other than timber).*

- ASTM: F711 *Specification for fibreglass-reinforced plastic (FRP) rod and tube.*
- ANSI/IEEE: 978 *Guide for in-service maintenance and testing.*
- ANSI/SIA: A99.2 *Vehicle-mounted elevating and rotating aerial devices.*
- ANSI/IEEE: 516 *Guide for maintenance methods on energised power lines.*

CODES OF PRACTICE

- *Approved Code of Practice for Safety and Health in Tree Work — Part 1: Arboriculture* (“The Arborists’ Code”), published by the Occupational Safety and Health Service, Department of Labour.
- *NZ Electrical Code of Practice for Electrical Safety Distances* (NZECP34:1993).
- *Approved Code of Practice for Power-Operated Elevating Work Platforms*, published by the Occupational Safety and Health Service, Department of Labour.
- *Guide for the Operation and Maintenance of Elevating Platform Vehicles*, Electrical Supply Authorities Engineers Association of NZ Inc.
- *Working on the Road*, a handbook for temporary control and safety at roadwork sites, published by Transit New Zealand.

GUIDELINES

- *Guidelines for the Provision of Facilities and General Safety and Health in Forestry Work*, published by the Occupational Safety and Health Service, Department of Labour.