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NEW ZEALAND ELECTRICAL CODE OF PRACTICE

for

ELECTRICAL SAFETY DISTANCES

Issued by the Office of
The Chief Electrical Inspector,
Energy & Resources Division, Ministry of Commerce

THE ELECTRICITY ACT 1992
APPROVAL OF ELECTRICAL CODE OF PRACTICE
FOR
ELECTRICAL SAFETY DISTANCES

Pursuant to Section 36 of the Electricity Act 1992 ("the Act")

On the 1st day of February 1993, the Secretary of Commerce issued the Electrical Code of Practice for Electrical Safety Distances ("the Code")

On the 4th day of February 1993, pursuant to Section 38 of the Act the Secretary published in the Gazette a notice of intention to apply to me for approval of the code, and there has been consultations with such persons (or their representatives) as will be affected by the Code and they have had the opportunity to consider possible effects and comment on those effects.

I have considered the comments concerning those effects and where necessary amendments were made to the Code.

Therefore Pursuant to Section 38 of the Act, I, John Luxton, Minister of Energy, have this day approved the Code as attached to this approval, which Code shall come into force on the 1st day of April 1993.

Dated this 18th day of March 1993.

John Luxton
Minister of Energy.

COMMITTEE REPRESENTATION

This Code of Practice was prepared by the Ministry of Commerce, Chief Electrical Inspector's Office with reference to the following organisations:

Electrical Supply Engineers' Association of NZ Inc.
New Zealand Electrical Institute
New Zealand Rail Limited
Telecom
TransPower
Institution of Professional Engineers of New Zealand

ACKNOWLEDGEMENT

The source material for this Code was derived from The Electrical Supply Regulations 1984 and the Electricity Supply Association of Australia Guidelines For the Design And Maintenance of Overhead Distribution and Transmission Lines.

REVIEW

This Code of Practice will be revised as occasions arise. Suggestions for improvement of this Code are welcome. They should be sent to the Chief Electrical Inspector's Office, Ministry of Commerce, P O Box 1473, WELLINGTON.

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INTRODUCTION

This Code sets out the distance requirements necessary for the installation and maintenance of overhead electric lines and other electrical works previously subject to particular provisions contained in the Electrical Supply Regulations 1984.

The distances set out in this Code are mandatory. Should it not be practical to achieve these distances and where safety is not compromised then a relaxation to these requirements may be sought from the Secretary of Commerce under the relevant regulations.

SECTION 1

SCOPE, INTERPRETATIONS, GLOSSARY AND NUMBERING

1.1 SCOPE

- 1.1.1 This Code of Practice covers all overhead electric lines, and the associated electrical equipment and apparatus, and personnel working on such lines. It also covers telecommunication lines and telecommunications personnel.
- 1.1.2 This Code sets minimum obligations in respect of the following matters:
- (a) The separation and height above ground of conductors.
 - (b) Limits for construction near conductors.
 - (c) Safe working distances.
- 1.1.3 The content of this Code does not preclude the applications of any statutory obligations in respect of the matters in clause 1.1.2.

1.2 INTERPRETATIONS

In this Code, unless the context otherwise requires:

- 1.2.1 Bare conductor - means a conductor without covering or insulation.
- 1.2.2 Conductor - means a wire or other form of conducting material suitable for carrying current, but not including wire or other metallic parts directly employed in converting electrical energy into another form.
- 1.2.3 Conductive parts - means any metal, other than an overhead conductor used for the conduction of electricity, eg. busbars.
- 1.2.4 Distance - means the distance under the worst case of conditions of maximum sag, from load current or solar radiation, or under deflection from climatic conditions. In the case of a line crossing another line, the worst case is that which results in the minimum spacing between the two lines or the minimum distance between persons or objects as the context requires.
- 1.2.5 Distribution line - means works used for the conveyance of electricity to one or more electrical installations.
- 1.2.6 Distribution main - means those electrical fittings which are jointly used by consumers which connect a distribution line to a service main or to the point of supply.
- 1.2.7 Electrical installation - means all fittings that form part of a system for

conveying electricity on a consumer's premises and are for the sole use of that consumer.

- 1.2.8 Exposed conductive part - means any part which can be touched and which is not a live part but which may become alive under fault conditions.
- 1.2.9 Live - means charged with electricity so that a difference in electrical potential exists between the conductor and earth.
- 1.2.10 Mains - means distribution mains and service mains.
- 1.2.11 Network operator - means any person so declared by the Governor-General by Order in Council under the Telecommunications Act 1987.
- 1.2.12 Secretary - means the Secretary of Commerce.
- 1.2.13 Service main - means those electrical fittings constructed from the boundary of a consumer's premises to the consumer's main switchboard or, where the main switchboard is not within the boundary of the consumer's premises, to the structure containing the electrical installation or part of it, which fittings are for the sole use of the consumer.
- 1.2.14 Telecommunication line - means any cable used exclusively for telecommunications or data transmission and includes any fibre optic cable of a construction which contains any electrically conducting materials, metallic strength bearing members, and also overhead cables with a wire catenary.
- 1.2.15 Traction systems - means any overhead electrical wiring or apparatus for any train, locomotive, tram, or trolley bus.
- 1.2.16 Voltage - means a difference of nominal potential existing between conductors or between conductors and earth whichever is the greater as follows:
- (a) Extra-low voltage is that not exceeding low voltage;
 - (b) Low voltage is that:
 - (i) in relation to alternating current, a voltage exceeding 32 volts but not exceeding 1000 volts, in each case taking the square root of the mean of the squares of the instantaneous values of a voltage during a complete cycle; and
 - (ii) in relation to direct current, a voltage exceeding 115 volts but not exceeding 1500 volts.
 - (c) High voltage is that exceeding low voltage.

1.3 GLOSSARY OF ABBREVIATIONS USED IN THIS CODE

| | |
|----|-------------|
| kV | Kilovolts |
| m | Metres |
| mm | Millimetres |
| V | Voltage |

1.4 NUMBERING SYSTEM OF THIS CODE

- 1.4.1 Sections are numbered 1 to 6.
- 1.4.2 Subsections are numbered by one full stop between two numbers. (e.g. 2.3)
- 1.4.3 Clauses are numbered by two full stops between three numbers. (e.g. 3.3.2)
- 1.4.4 Paragraphs contain numbering punctuated by one or more full stops together with a parenthesised letter.
- 1.4.5 Subparagraphs are represented by lower case roman numerals enclosed in parenthesis following paragraphs.

SECTION 2**DISTANCES OF CONDUCTORS FROM GROUND****2.1 GENERAL**

- 2.1.1 Conductors shall have a distance from ground of not less than that specified in Table 1.
- 2.1.2 The requirements of subsections 2.1 and 2.2 do not apply to traction systems or to telecommunication lines, substations and generating stations.

TABLE 1**MINIMUM VERTICAL DISTANCE FROM GROUND FOR CONDUCTORS**

| Voltage and Description of Lines | Metres |
|---|---------------|
| Exceeding 110,000 volts | 7.5 |
| Exceeding 11,000 volts but not exceeding 110,000 volts | 6.5 |
| Exceeding 650 volts but not exceeding 11,000 volts: | |
| (a) Along or across any road or footpath | 6.5 |
| (b) In any other place | 5.5 |
| Not exceeding 650 volts | |
| (a) Distribution lines | |
| (i) That part of the span connecting to the distribution main or service main and located on the road but not crossing any part of the road used by vehicular traffic | 4.0 |
| (ii) Any other part of the distribution line along or across the road or private road or way used by vehicular traffic | 5.5 |
| (iii) In any other place | 5.0 |
| (b) Distribution mains and service mains: | |
| (i) Along or across any part of a private road or way used or likely to be used by vehicles | 5.5 |
| (ii) Along or across any footpath used only by pedestrians | 4.0 |
| (iii) For the last span connected to any building or other structure other than over a place to which members of the public have access: | |
| In places likely to be used by vehicles | 3.5 |
| Elsewhere | 2.7 |
| (iv) for the last span connected to any building or other structure in places not used or likely to be used by vehicular traffic and where the conductors are insulated to the full working voltage | 2.5 |
| (v) In any other place | 5.0 |

- 2.1.3 Every conductor of an overhead electric line shall be so erected that it is not readily accessible to any person without the use of a ladder or other climbing device. No climbing step shall be placed at a height of less than 3 metres above ground level.
- 2.1.4 All supports (including stay wires, stay anchors, and other supporting equipment) for conductors shall be so located as to avoid undue obstruction to pedestrian or vehicular traffic. Where any stay wire is not erected alongside a substantial fence or hedge and is less than 2.5 metres from the ground in any direction, it shall be conspicuous or be marked. Any stay wire erected across the part of any public road used by vehicular traffic shall have a minimum vertical distance above ground of 5.5 metres.
- 2.1.5 Stay wires which are less than 2.5 metres from the ground shall have either a connection to the neutral or a separate earthing connection, unless they are in direct and adequate contact with the earth. Alternatively, an insulator having a wet flashover value not less than the overhead line voltage shall be inserted in the stay in a suitable position.

2.2 MINIMUM DISTANCES IN ANY DIRECTION FROM GROUND

- 2.2.1 In addition to the requirements of clause 2.1.1 the minimum distances from ground in any direction for conductors shall not be less than those specified in Table 2.

TABLE 2

MINIMUM DISTANCES IN ANY DIRECTION FROM GROUND

| Voltage of Conductor | Metres |
|--|----------------|
| exceeding 220 kV | 5.5 |
| between 110 kV and 220 kV | 5.0 |
| between 66 kV and 110 kV | 4.5 |
| between 33 kV and 66 kV | 3.0 |
| between 650 V and 33 kV | 2.0 |
| Conductors insulated to full working voltage | no restriction |

SECTION 3**SPACING OF CONDUCTORS****3.1 CROSSING OF CONDUCTORS NOT SHARING A COMMON SUPPORT**

- 3.1.1 Under still air conditions, the vertical separation between any conductor of the lower circuit at minimum sag and any point to which a conductor of the higher circuit may sag under the influence of load current (excluding fault current), and solar radiation shall not be less than that prescribed in Table 3.

TABLE 3**MINIMUM VERTICAL SEPARATION FOR CONDUCTORS**

| Higher voltage of either circuit | Separation for unattached crossing |
|---|---|
| 220 kV and above | 4.0 m |
| 110 kV | 3.0 m |
| 66 kV | 3.0 m |
| 50 kV | 3.0 m |
| 33 kV | 2.0 m |
| 22 kV | 1.5 m |
| 11 kV | 1.2 m |
| 650 V and below | 0.6 m |

- 3.1.2 Where lines are not in conformity with the requirements of clause 3.1.1 of this section and an alteration or reconstruction is carried out on those lines, those lines shall be brought into conformity with clause 3.1.1.
- 3.1.3 The minimum distance between the conductors of one line and the pole or support of another line shall, under maximum design sag and deflection conditions, be not less than that prescribed in Table 6.
- 3.1.4 When two circuits of different voltage cross each other, the conductors of the higher voltage circuit shall be placed above those of the lower voltage circuit.
- 3.1.5 The minimum distance to a traction system is 2 metres for circuits below 50 kV. Above 50 kV, table 3 applies.

NOTE: The separations specified in table 3 are not intended to apply where conductors of both circuits are insulated. In the case of one of the insulated

conductors operating at a voltage in excess of 650 volts, the conductor should include an earthed screen.

3.2 CONDUCTORS OF DIFFERENT CIRCUITS CROSSING ON THE SAME SUPPORT (Attached Crossing)

- 3.2.1 The requirements of this subsection do not apply to traction systems.
- 3.2.2 Where two circuits of different voltage cross each other and are attached to the same support, the conductors of a higher voltage circuit shall be placed above those of the lower voltage circuit.
- 3.2.3 Where two circuits of different voltages cross and are attached to the same support, a detailed study of the overvoltages and conductor motion is required to establish the allowable electrical separation of the circuits under maximum probable overvoltages at the worst case deflection of both circuits. These separations may then be used. Where a detailed study of the overvoltages and conductor motion has not been undertaken the vertical separations between conductors of the different circuits at any point on the support under normal working conditions shall not be less than prescribed in Table 4.

TABLE 4

MINIMUM SEPARATION OF CONDUCTORS ON SUPPORT

| Higher Voltage of Either Circuit | Separation for Attached Crossing | |
|--|---|-------|
| exceeding 110 kV | | 2.5 m |
| exceeding 33kV but not exceeding 110 kV | Lower voltage greater than 650 V | 2.0 m |
| | Lower voltage less than 650 V | 1.5 m |
| 33 kV and below | Lower voltage greater than 650 V | 1.5 m |
| | Lower voltage less than 650 V | 1.0 m |
| Insulated conductor with or without earth screen | No restriction | |

NOTE: In the case of lines operating at less than 650 volts, adequate measures should be taken to protect against unacceptable voltage rise between the lower voltage line and any structure energised due to the occurrence of a fault on the higher voltage line.

- 3.2.4 Where conductors are taken down a pole or other support to or from a

transformer or other plant or equipment, the distance between any lines (not being lines insulated to full working voltage) shall not be less than the following:

900 mm between any line of low voltage and a line of 33,000 volts.

600 mm between any line of low voltage and a line of 11,000 volts.

- 3.2.5 A reduced distance may be used at or near the terminals of any such transformer or other plant or equipment where those terminals have a lesser distance between them than the minimum distance specified.

3.3 CONDUCTORS ON SAME SUPPORTS (Same or Different Circuits and Shared Spans)

- 3.3.1 The requirements of this subsection does not apply to
- (a) Insulated pilot cables erected for the purpose of protection or telecommunication;
 - (b) Auxiliary power supplies;
 - (c) Overhead earth wires;
 - (d) Insulated conductors (with or without earthed screens) of any voltage;
 - (e) Conductors operating at 110,000 volts or more where there are no other conductors of a lower voltage on the support.

- 3.3.2 When there are two circuits of different voltage, the conductors of the higher voltage circuit shall be placed above those of the lower voltage circuit.

- 3.3.3 Any two bare overhead conductors having a difference in nominal voltage with respect to each other shall have vertical, horizontal or angular separation from each other in accordance with the values required by paragraph (a) of this clause, provided that the distance at the support or at any part in the span shall not be less than the separation nominated in paragraph (b) of this clause. The separation given by paragraph (a) of this clause is intended to cater for out-of-phase movement of conductors under wind conditions with minimum turbulence. The separation given by paragraph (b) of this clause is a minimum under any circumstances.

- (a) At mid - span

$$\sqrt{X^2 + (1.2Y)^2} \geq \frac{U}{150} + 0.4\sqrt{D + I_i}$$

where:

- X is the projected horizontal distance in metres between the conductors at mid span;

- Y is the projected vertical distance in metres between the conductors at mid span;
- U is the root mean square vector difference in potential (kV) between the two conductors when each is operating at its nominal voltage. In determining the potential between conductors of different circuits, regard should be paid to any phase differences in the nominal voltages;
- D is the greater of the two conductor sags in metres at the centre of an equivalent level span and at the conductor design operating temperature in still air;
- li is the length in metres of any freely swinging suspension insulator associated with either conductor.

For the purposes of this clause an equivalent level span shall mean a span:

- * which has the same span length in the horizontal projection as the original span; and
- * in which conductor attachments at supports are in the same horizontal plane; and
- * in which the horizontal component of conductor tension is the same as in the original span.

- (b) At the supports or at any point in the span:
- (i) for voltages up to and including 11,000 volts the separation shall be a minimum of 0.4 metres;
 - (ii) for voltages exceeding 11,000 volts the separation shall be a minimum of 0.4 m plus 0.01 m for each 1000 volts in excess of 11,000 volts.

- NOTES:
- (i) When conductors of different circuits are located vertically one above the other, consideration should be given to the need to prevent clashing of conductors of different circuits under the influence of load current in one or both circuits.
 - (ii) Where low voltage spacers are used, spacings may be less than those specified. It is suggested that the spacer be taken to be a conductor support for the purpose of calculating conductor spacing.
 - (iii) The empirical formula, paragraph (a) above, is intended to minimise the risk of conductor clashing; however, circumstances do arise where it is not practicable to give guidance or predict outcomes. Some of these situations involve :
Extremely turbulent wind conditions.

The different amount of movement of conductors of different size and type under the same wind conditions.

Conductor movement under fault conditions (particularly with horizontal construction).

- (iv) The following situations may also need to be considered when considering spacing of conductors:

Knowledge of local conditions would be required to make design decisions.

Aircraft warning devices.

Large birds which may collide with conductors, causing them to come together, or whose wingspan is such as to make contact between bare conductors and conducting crossarms.

Flocks of birds resting on conductors are known to "lift-off" simultaneously, causing violent conductor movement.

Ice loading and ice shedding.

3.4 CONDUCTORS NEAR TELECOMMUNICATION LINES

- 3.4.1 A conductor shall always cross or run above telecommunication lines and the minimum distance at any time between any conductor and a telecommunication line shall not be less than the distances specified in table 3.
- 3.4.2 Notwithstanding the requirements of clause 3.4.1, the minimum separation of a bare telecommunication line from a conductor shall not be less than 1.8 metres from a high voltage conductor and 1.2 metres from a low voltage conductor except that conductors insulated to full working voltage and covered telecommunication conductors may have a separation of not less than 300 millimetres.
- 3.4.3 Stay wires shall be at a distance of more than 300 millimetres from any uncovered telecommunication line.

SECTION 4**DISTANCES OF CONDUCTORS FROM BUILDINGS, SCAFFOLDING AND RAILWAY LINES****4.1 CONSTRUCTION OF BUILDINGS, SCAFFOLDING AND OTHER STRUCTURES, ETC. NEAR CONDUCTORS**

- 4.1.1 No person shall erect or cause or permit to be erected any building, structure, scaffold, or any other thing, or part of any building, structure, scaffold, or any other thing, at a distance in any direction from the conductor of an overhead electric line of less than that shown in Table 5.

TABLE 5

MINIMUM DISTANCE IN ANY DIRECTION FOR CONSTRUCTION OF BUILDINGS, SCAFFOLDING AND OTHER STRUCTURES NEAR CONDUCTORS

| Line voltage | Minimum distance under normal conditions |
|---|--|
| Not exceeding 66 kV (maximum span 125 m) | 4.0 m |
| Exceeding 66 kV (maximum span 125 m) | 5.0 m |
| Any voltage (span greater than 125 m but less than 250 m) | 6.0 m |
| Any voltage (span greater than 250 m but less than 500 m) | 8.0 m |
| Any voltage (span exceeding 500 m) | As agreed with owner of the line but not less than 8.0 m |

- 4.1.2 If any building, structure, scaffold, or other thing, or any part of a building, structure, scaffold, or other thing, is erected at a distance from any conductor of an electric line less than that permitted by clause 4.1.1 either:
- (a) The building, structure, scaffold, or other thing, or the part of the building, structure, scaffold, or other thing, shall be so removed or altered by the persons responsible for its erection that the prescribed minimum distances are obtained; or
 - (b) The owner of the overhead electric line may remove the line to a new position that will provide the prescribed minimum distance at the cost of the said person responsible.

4.1.3 Low voltage conductors shall be installed at a height of more than 5.0 metres above any diving platform or structure on which a person may stand or climb, and in any case more than 5.0 metres above the water level of a swimming pool.

4.1.4 High voltage conductors shall not be installed above a pool area.

4.2 LOCATION OF CONDUCTORS NEAR BUILDINGS AND OTHER STRUCTURES

4.2.1 The minimum distance from any structure, building, post or line support (other than a support to which the line under consideration is attached or a support of another overhead line which crosses the line under consideration) to any position to which a conductor in an overhead line may swing under the influence of wind or sag, load current or solar radiation, shall not be less than those specified in Table 6.

4.2.2 Subsection 4.2 does not apply to cable systems supported along the facade of a building, conductors insulated to full working voltage or to traction systems.

4.2.3 The distances specified in A and B of Table 6 shall also be maintained above an imaginary horizontal line extending outward for the distance specified in C.

Figures 1 and 2 illustrate the application of the table to a particular building. The letters A to D refer to distances A to D as set out in Table 6.

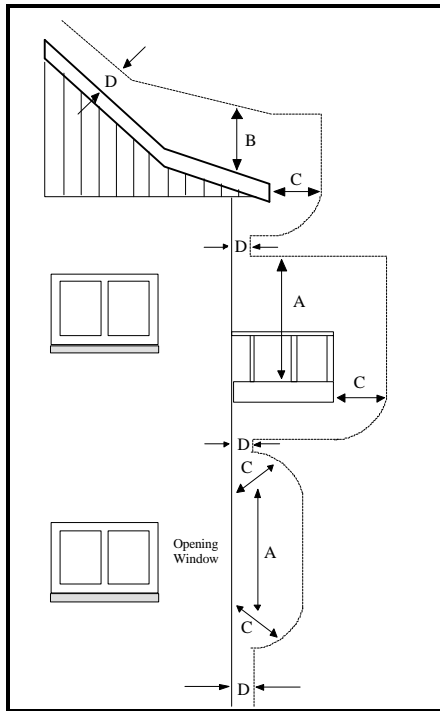


Figure 1

The above illustration applies if the height of the railing (or similar) PLUS distance B is greater than distance A.

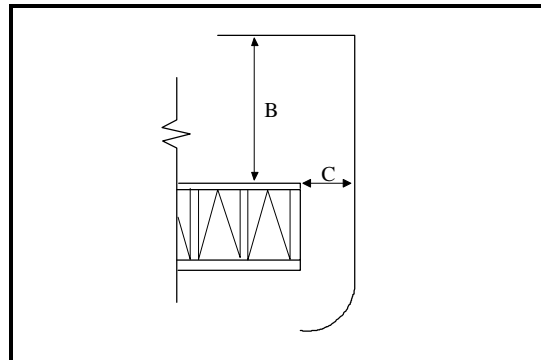


Figure 2

TABLE 6**DISTANCES OF OVERHEAD ELECTRIC LINES FROM BUILDINGS AND OTHER STRUCTURES**

| | U \leq 650 V | | | U > 650 V | | 650 V <U _z 33 kV | 33 kV <U _z 110 kV | 110 kV <U _z 220 kV | exceeds 220 kV |
|---|----------------|--------------|-------------|--|-------------------------------------|-----------------------------------|------------------------------------|-------------------------------------|-------------------|
| | Insulated | Bare Neutral | Bare Active | Insulated without earthed screen | Insulated with earthed screen | | | | |
| A Vertically above those parts of any structure normally accessible to persons | 2.7 m | 2.7 m | 3.7 m | 3.7 m | 2.7 m | 4.5 m | 5.0 m | 6.5 m | 7.0 m |
| B Vertically above those parts of any structure not normally accessible to persons but on which a person can stand | 0.1 m | 2.7 m | 2.7 m | 2.7 m | 0.1 m | 3.7 m | 4.5 m | 6.0 m | 6.5 m |
| C In any direction (other than vertically above) from those parts of any structure normally accessible to persons, or from any parts not normally accessible to persons but on which a person can stand | 0.1 m | 0.9 m | 1.5 m | 1.5 m | 0.1 m | 2.1 m | 3.0 m | 4.5 m | 5.0 m |
| D In any direction from those parts of any structure not normally accessible to persons | 0.1 m* | 0.3 m* | 0.6 m* | 0.6 m | 0.1 m | 1.5 m | 2.5 m | 3.5 m | 4.0 m |

* These distances can be further reduced to allow for termination at the point of attachment

4.3 EXCAVATIONS OR CONSTRUCTION NEAR ELECTRIC LINE SUPPORTS

- 4.3.1 Except with the prior written consent of the owner, and subject to such conditions as may be specified in the consent, no person shall, in the case of any pole supporting any conductor, excavate or otherwise interfere with any land:
- (a) Within 2 metres of the pole; or
 - (b) At a greater depth than 750 mm between 2 metres and 5 metres of the pole; or
 - (c) In such a way as to create an unstable batter.
- 4.3.2 In the case of any tower or pylon supporting any conductor, no person shall without the written consent of the owner of the tower or pylon:
- (a) Excavate or otherwise interfere with any land:
 - (i) within 6 metres of the outer edge of the visible foundations of the tower or pylon; or
 - (ii) at a depth greater than 3 metres, between 6 metres and 12 metres of the outer edge of the tower or pylons; or
 - (iii) in such a way as to create an unstable batter; or
 - (b) Build any structure within 12 metres from the foundation of the tower or pylon.
- 4.3.3 Excavated or other material shall not be deposited under or near an overhead electric line so as to reduce the conductor distance to ground to less than those distances required by this Code.
- 4.3.4 Nothing in clauses 4.3.1 and 4.3.2 of this clause shall apply in respect of normal agricultural cultivation or the repair, sealing, or resealing, of the existing surface of any road or footpath.
- 4.3.5 Except with the prior written consent of the line owner, conductive fences shall not be constructed within 5 metres from any tower, pylon, or metal pole. As part of the consent the line owner may prescribe the design of any such fence within this 5 metre distance.

4.4 CONDUCTORS NEAR RAILWAY LINES

- 4.4.1 Subject to subsection 3.1 the minimum distances between conductors and the top of the rail of a railway, when the conductors are at a maximum sag, shall not be less than that specified in Table 7.

TABLE 7**MINIMUM DISTANCES FROM RAILWAY LINES**

| Conductors | Metres |
|---|---------------|
| Above 110,000 volts | 7.5 |
| Above 22,000 volts but not exceeding 110,000 volts | 7.5 |
| Up to and including 22,000 volts | 6.5 |
| Telecommunication lines on electric line supports | 6.0 |
| Telecommunication lines not on electric line supports | 5.5 |
| Stay Wires | 5.5 |
| Earthing connection | 5.5 |

- 4.4.2 The minimum distance of all conductors at maximum sag from the traction communication lines or signal wires shall be those applying to telecommunication lines.
- 4.4.3 All conductors in the span crossing a railway traction system, and for a full span on either side of the railway crossing, shall be installed and maintained with a minimum breaking strength of 10 kilonewtons.
- 4.4.4 Where major structural alterations are made to an electric line crossing a railway line, the owner of the line shall ensure that the line so altered fully complies with the requirements of this Code.
- 4.4.5 No pole or other support shall be erected nearer than 4 metres to the centre of the nearest railway track (being measured horizontally from the centre of the nearest two rails to the nearest face of the pole or other support) unless by agreement with owner of the railway.

SECTION 5

5.1 MINIMUM APPROACH DISTANCES FOR MOBILE PLANT NEAR CONDUCTORS

- 5.1.1 The owner or operator of any crane, loader, excavator, drilling or pile driving equipment, or other like device shall not use or bring any such device or part thereof or any load thereon closer than 4 metres to the conductors of any overhead electric line until the owner or operator has received in writing from the owner of the overhead electric line notification of the voltage of the overhead electric line and of the appropriate minimum distance specified in clause 5.1.3.
- 5.1.2 The owner or operator of devices to which clause 5.1.1 applies may apply in writing to the owner of the overhead electric line to use any such device as specified closer than 4 metres from the conductors of any overhead electric line. After receipt of such an application the owner of the overhead electric line shall notify the owner or operator, in writing;
- (a) Of the voltage of the overhead electric line and the minimum distance to be observed in accordance with the requirements of clause 5.1.3; and
 - (b) Any other conditions to be observed while working in proximity to the overhead electric line.
 - (c) This clause does not apply where the operator of any such device is an employee of an Electricity Distributor, Electricity Operator or Network Operator and engaged on lines work.
- 5.1.3 The minimum distance between a conductor of any live overhead electric line and any device to which clause 5.1.1 applies, or any load thereon, shall be in accordance with Table 8.

TABLE 8**MINIMUM DISTANCE BETWEEN CONDUCTORS AND ANY MOBILE PLANT**

| Line Voltage | Metres |
|------------------------------------|---------------|
| Exceeding 33 kV | 4.0 |
| Over 22 kV but not exceeding 33 kV | 2.0 |
| Exceeding 650 V but not over 22 kV | 1.5 |
| Not exceeding 650 volts | 1.0 |

- 5.1.4 Where any device to which clause 5.1.1 applies is likely to be used at any time in the proximity of overhead electric lines, the owner or operator of such device shall affix an approved warning notice in a conspicuous place as near as practicable to the operator's position. The notice shall be maintained in a legible condition and shall state:
- "WARNING, KEEP CLEAR OF POWER LINES**
- Unless the operator has received approval in writing to the contrary, the distance between any live overhead power line and any part of this machine or load carried shall be **AT LEAST 4 METRES"**.
- 5.1.5 The minimum distances specified in Table 8 shall not be required to be observed where the working methods are in accordance with safety practices otherwise valid.
- 5.1.6 Clauses 5.1.1, 5.1.3 and 5.1.5 shall not apply with respect to any distance between any device to which clause 5.1.1 applies and any conductor forming part of the device or any collector wire, insulated cable, or flexible cord used for the purpose of supplying electricity to the device.
- 5.1.7 Any mechanically-operated hedge cutter used under or in close proximity to any overhead electric line shall be so operated as to prevent hedge clippings or other material being thrown into contact with the line.
- 5.1.8 The operator of any device to which clause 5.1.1 applies, which is to be used directly above any overhead electric line, shall give reasonable notice of the work to the owner of the overhead electric line.
- 5.1.9 While any device to which clause 5.1.1 applies, is in transit on a road, clause 5.1.1 shall not apply in circumstances where the relevant requirements of the Traffic Regulations 1976 are observed.

SECTION 6

SAFETY DISTANCES WITHIN SUBSTATIONS AND SWITCHYARDS

6.1 INSTALLATION OF SWITCHGEAR

- 6.1.1 Every generating station or substation switchboard shall be so erected as to provide, in front and behind the switchboard, clear unobstructed spaces as follows:
- (a) In the case of low voltage switchboards (not including enclosed spaces referred to in paragraph (c) of this clause);
 - (i) an overhead distance of not less than 2.2 metres from the floor to any conductor under which it is necessary to pass; and
 - (ii) a passageway in front of the switchboard with at least 1 metre horizontal distance to the face of the switchboard or any bare live metal affixed thereto;
 - (b) In the case of high voltage switchboards other than;
 - (i) those exceeding 11,000 volts between phases;
 - (ii) enclosed spaces to which paragraph (c) of this clause applies;an overhead distance of not less than 2.5 metres from the floor to any conductor under which it is necessary to pass, and a passageway in front of the switchboard with at least 1 metre horizontal distance to the face of the switchboard;
 - (c) In every enclosed space behind any switchboard where only skilled persons would be employed when the switchboard is alive (unless all live metal other than that being worked on is suitably screened) -
 - (i) an overhead distance of not less than 2.5 metres from the floor to any bare conductor under which it is necessary to pass; and
 - (ii) a horizontal distance of not less than 1.8 metres for high voltage, and not less than 1.2 metres for low voltage where it is possible to pass between any conductive parts less than 2.5 metres above the floor; and
 - (iii) a horizontal distance of not less than 1 metre between any conductive parts less than 2.5 metres above the floor and any wall, screen, or similar object.
 - (d) In the case of high voltage switchboards exceeding 11,000 volts such distances as are in accordance with good engineering practice.
 - (e) The width of any passageway provided behind any switchboard shall have a horizontal distance of at least 1 metre from the back of the switchboard. Where any screen is erected at the back of the switchboard this distance shall be measured from that screen.

6.2 PRECAUTIONS WITH CONDUCTIVE PARTS

- 6.2.1 All live conductive parts less than 4.5 metres above ground level, and attached to any pole or other support, shall be protected in such a manner as to prevent any unauthorised person making accidental contact in reasonably foreseeable circumstances.
- 6.2.2 All metal attached to any pole or other support, and not connected to the supply system, which may become charged by accident or otherwise shall be earthed or otherwise adequately protected if placed less than 2.5 metres above ground level.