

each side of the pole may be insulated. This insulation shall be effected at the expense of the licensee in cases where the telegraph lines existed previously to the erection of the electric lines.

In every crossing-span the maximum tension in any conductor shall not exceed one-half the elastic limit of the conductor under the conditions of minimum temperature and wind-pressure specified in clause 12.

Where electric lines and telegraph lines other than lead-covered cables intersect, high-pressure lines shall be insulated with not less than 600-megohm grade of vulcanized rubber, and low-pressure lines with weatherproofed covering as prescribed in clause 17.

Where overhead electric lines at extra-high pressure intersect telegraph lines the electric lines shall be subject to special conditions as may be required by the Minister of Telegraphs in each case of such crossing.

Where lead-covered cables are crossed above or below by the electric lines, the latter lines shall be insulated with not less than 600-megohm-per-mile grade of vulcanized rubber throughout the crossing-span.

Efficient guard-wires effectively earthed, or other approved protective devices, shall be erected, in a manner to meet with the approval of the Minister of Telegraphs, at all crossings or places where electric lines and telegraph lines intersect, or at any place where such protection may be considered necessary by the Minister of Telegraphs.

Such guard-wires shall be carried on substantial supports at a height of 2 ft. above the electric lines if the telegraph lines pass over the electric lines, or 2 ft. above the telegraph lines if they pass under the electric lines. In addition to the above precautions telegraph lines shall be insulated if deemed necessary by the Minister of Telegraphs.

The cost of all necessary guard-wires and special provisions required to comply with this clause, or deemed to be necessary as a protection to telegraph lines generally shall be borne by the licensee when the telegraph lines are erected before the electric lines. In cases where the electric lines are erected before the telegraph lines, the licensee, on receipt of notice from the district Telegraph Engineer of the Post and Telegraph Department, or his deputy, that it is proposed to run a telegraph line along the route, shall forthwith make the necessary changes required to comply with this clause at any points at which electric lines already cross such routes, the cost of such changes being borne by the Post and Telegraph Department.

24. *Transmission-lines paralleling Telegraph Lines.*

Where a transmission-line runs parallel and adjacent to a telegraph line suitable and approved transpositions of the power-lines shall be effected if so required by the Minister of Telegraphs, the expense of such transposition being borne by the licensee.

25. *Lines not in Commission.*

An aerial line shall not be permitted to remain erected after it has ceased to be used for the supply of energy unless the licensee intends within a reasonable time again to take it into use.

26. *Lines crossing Metallic Substances.*

When an aerial line crosses or is in proximity to any metallic substance, precautions shall be taken by the licensee against the possibility of the line coming into contact with the metallic substance by breakage or otherwise.

27. *Railway Crossings.*

No work of any nature shall be erected or constructed upon, over, or under any part of New Zealand Government railways until the licensee has obtained the consent of the Minister of Railways thereto, as required by section 4 of the Government Railways Amendment Act, 1910 (No. 2.)

Where overhead lines cross the railway the span between the supports shall not exceed 100 ft. in length where practicable. The pole on each side of the railway shall be embedded in concrete.

The lines over the railway, and for a span each side of the railway, shall be erected with a factor of safety on the basis that a maximum tension in the conductor shall not exceed half the elastic limit of the conductor under the conditions of minimum temperature and wind-pressure as specified in clause 12.

The minimum clearance above rail-level shall be 24 ft. for all lines working at low or high pressure, and 30 ft. for all lines working at extra-high pressure. The dip or sag shall be calculated on the assumption of a maximum temperature of 122° F. The supports for the lines shall have a factor of safety of four (4) under the conditions of wind-pressure hereinbefore specified.

The conductors shall be hard-drawn stranded aluminium or copper cable.

For any pressure not exceeding 3,300 volts the conductors in the crossing-span may be bare or may be insulated. For extra-high pressure the conductors shall be bare.

Where bare conductors are carried through the crossing-span provision shall be made for the erection of approved earthing devices, which shall be so fixed under each conductor that in the event of a conductor breaking, contact with the earthing device shall be made by such conductor before coming into contact with a passing train.

Telephone wires may be run with a minimum clearance above the rails of 24 ft., and shall be of hard-drawn copper of not less than No. 12 S.W.G. where they cross the railway, and for a clear span on either side.

Guard-wires shall be erected by the Railway Department over the railway wires at the expense of the licensee wherever they may be deemed to be necessary by the Minister of Railways.

Wherever the words "Minister of Telegraphs" or "Minister" appear in clauses 20, 21, 22, 23, and 24, the same shall be read as Minister of Railways in all cases where the Railway Department's interests are affected.

28. *Earth-wires.*

Earth-wires, where led down poles, shall be protected by a casing for a distance of 8 ft. from the ground. A test shall be made every twelve months, or oftener if required, to ensure that the earth-wire is intact, and that the earth is effective. A record of all such tests shall be kept.

29. *Lightning-arresters.*

Where any portion of any electric line, or support for an electric line, is exposed in such a position as to be liable to injury from lightning it shall be efficiently protected against such liability.

30. *Transformers.*

Transformers shall be placed either on poles or in a substation. Where transformers are placed on poles they shall be fitted with watertight cases, and attached to the poles at such a height as to make them inaccessible except by means of a ladder or other special appliance. Where transformers are placed within a substation, the substation shall be inaccessible except to authorized persons; all high-pressure or extra-high-pressure conductors therein shall be thoroughly insulated or protected from accidental contact. A substantial insulating rubber mat or insulated wooden platform and rubber gloves shall be supplied. The cases of all transformers, whether within or without a substation, shall be connected to an efficient earth by a copper conductor in accordance with the rules of the Institution of Electrical Engineers of Great Britain for earthing.

Where cables are led down poles to and from transformers placed on poles they shall be protected on the poles by being run in iron pipes, which shall be effectively earthed.

In every case where a high-pressure supply is transformed for the purpose of supply to one or more consumers, some suitable automatic and quick-acting means shall be provided to protect the consumers' wires from any accidental contact with or leakage from the high-pressure circuit, either within or without the transforming apparatus.

31. *Motor Installations.*

The frames of fixed motors shall be connected to an efficient earth by a copper conductor, in accordance with the rules of the Institution of Electrical Engineers of Great Britain for earthing. All metal casings of switches, resistances, fuses, cables, and wires shall be efficiently earthed in a similar manner.

Every motor of $1\frac{1}{2}$ horse-power or over must be controlled by an efficient quick-break protected switch suitable to prevent arcing, and conveniently placed so that the person in charge of the motor can cut off wholly the supply from the motor and all devices in connection therewith.

Efficient fuses or other automatic cutout must be provided to efficiently protect the conductors in each circuit from excess of current.

Every direct-current motor circuit supplied from a tramway trolley-wire or feeder shall be provided with a single-pole fuse cutout, inserted in the positive conductor, and arranged to operate with an overload of 100 per cent. above the rated full load of such circuit. Such fuse cutout shall be placed in a suitable locked or sealed receptacle of fire-proof construction, fixed at a convenient height on the pole nearest the point where the positive conductor leaves the trolley-wire or feeder. Every such circuit shall also be provided, in the immediate vicinity of each motor connected thereto, with a double-pole switch and fuse cutout or circuit-breaker arranged to operate with an overload of 50 per cent. above the rated full load of the motor so controlled. The negative conductor of every such circuit shall be continuous throughout its length from the switch-terminal to the tramway-rail, to which it shall be effectively bonded.

Every precaution shall be taken in choosing positions for and in wiring and setting-up of motors, and the necessary devices in connection therewith, so that there shall be no danger of fire being caused by their normal or abnormal action, or of shock being sustained, or in the ordinary handling thereof.