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NEW ZEALAND ELECTRICAL CODE OF PRACTICE

for

SINGLE WIRE EARTH RETURN SYSTEMS

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

THE ELECTRICITY ACT 1992
APPROVAL OF ELECTRICAL CODE OF PRACTICE
FOR
SINGLE WIRE EARTH RETURN SYSTEMS

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 Single Wire Earth Return Systems ("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.

ACKNOWLEDGEMENT

The source material for this Code was derived from the following documentation, Conditions Governing Single-Conductor Earth-Return Systems issued by the Secretary of Energy on the 1st day of April 1976.

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 is based on the Conditions Governing Single Conductor Earth Return Systems issued by the Secretary of Energy on the 1st day of April 1976.

The Code sets requirements for the design and installation for this type of installation.

SECTION 1

SCOPE, INTERPRETATIONS AND NUMBERING

1.1 SCOPE

This Code sets out requirements associated with single wire earth return systems.

1.2 INTERPRETATIONS

In this Code, unless the context otherwise requires:

- 1.2.1 Step Voltage - means the difference in surface potentials experienced by a person bridging a distance of 1 metre with the person's feet apart without contacting any other object.
- 1.2.2 Touch Voltage - means the voltage which will appear between any point of contact with uninsulated metalwork located within 2.5 metres from the surface of the ground within a horizontal distance of 1.25 metres from the vertical projection of the point of contact with the uninsulated metalwork.

1.3 NUMBERING SYSTEM OF THIS CODE

- 1.3.1 Sections are numbered 1 to 2.
- 1.3.2 Subsections are numbered by one full stop between two numbers. (eg 1.2)
- 1.3.3 Clauses are numbered by two full stops between three numbers. (eg 1.2.1)
- 1.3.4 Subclauses are numbered by three full stops between four numbers. (eg 1.2.1.1)

SECTION 2

GENERAL REQUIREMENTS

2.1 ISOLATING TRANSFORMERS

Single wire earth-return circuits (earth-return circuits) are to be supplied from double-wound transformers (isolating transformers). These circuits are to supply only double-wound step-down transformers having either 3-wire 460/230 volt or 2-wire 230 volt secondaries operating as for multiple-earthed-neutral system.

2.2 EARTHING ARRANGEMENTS

2.2.1 Isolating and step-down transformer windings connected to single wire earth-return circuits shall be fully insulated from their tanks.

2.2.1.1 The connection with earth shall be made externally by means of duplicate conductors of stranded copper each having a cross-sectional area of not less than 16 mm².

2.2.1.2 The duplicate conductors shall be installed unbroken and without joint, using different routes, and shall have separate and independent attachment to the earth electrode.

2.2.1.3 The earth-connection shall be of resistance not greater than 5 ohms to earth and shall be so installed as to prevent danger from voltage gradients at ground level. Step and touch potentials shall be in accordance with the New Zealand Electrical Code of Practice for Power Systems Earthing 1993 (ECP 35:1993).

2.2.2 The earth electrode may be used for other earthing and bonding connections. Any such connections may be either by a direct connection to the earth electrode or by a connection to the earthing conductor.

2.3 LOAD CURRENT

The maximum permissible load current in any earth-return circuit shall be 8 amperes.

2.4 PROTECTION

The overload protection of earth-return circuits shall be such as to reduce to a practicable minimum the risk of a conductor remaining alive after it has fallen owing to breakage or otherwise.

2.5 SEPARATION FROM OTHER SERVICES AND PLANT

- 2.5.1 The minimum separation between any conductor of an earth-return circuit and any open wire overhead communication line shall be 80 metres, except at crossings.
- 2.5.2 No earth-return circuit conductor shall be erected parallel to any open wire overhead communication line so that the normal induced longitudinal voltage in the communication line exceeds 2 volts rms.
- 2.5.3 The minimum separation between any conductor of an earth-return circuit parallel with any open wire communication circuit shall be in accordance with Table 1.

TABLE 1

Length of Parallel with Communication Circuits (km)	Minimum Average Separation from Communication Circuits (metres)			
	p = 5 ohm-metre	p = 47 ohm-metre	p = 200 ohm-metre	p = 1000 ohm-metre
8	220	640	1350	3060
16	300	1000	2000	4570
24	400	1230	2430	5790
32	480	1430	2900	6860
40	540	1600	3240	7460

p = earth resistivity in ohm-metre