NZECP 11:1993

NEW ZEALAND ELECTRICAL CODE OF PRACTICE

for

INSPECTION AND TESTING OF

LOW VOLTAGE INSTALLATIONS FOR CERTIFICATION PURPOSES

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

INSPECTION AND TESTING OF

LOW VOLTAGE INSTALLATIONS FOR CERTIFICATION PURPOSES

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 Inspection and Testing of Low Voltage Installations for Certification Purposes ("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 day of 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 Contractors' Association of NZ Inc.
Electrical Supply Engineers' Association of NZ Inc.
New Zealand Electrical Institute
Electrical Inspectors' Association
Institution of Professional Engineers of New Zealand

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

Under the Electricity Act 1992 changes have been made to the inspection and certification requirements for prescribed electrical work.

This Code of Practice outlines requirements under the Act and associated regulations for the new inspection and certification regime.

INSPECTION AND TESTING OF LOW VOLTAGE INSTALLATIONS FOR CERTIFICATION PURPOSES

SECTION 1

SCOPE, INTERPRETATIONS, GLOSSARY, GENERAL AND NUMBERING

1.1 SCOPE

1.1.1 This Code sets out the requirements for the inspection and testing of low voltage electrical installations for certification purposes.

1.1.2 The Code includes:

(a) Requirements for the testing and certification by inspectors of electrical work carried out by owners of domestic premises.

(b) Requirements for the testing and certification of prescribed electrical work other than that carried out by owners of domestic premises.

(c) Inspection and testing requirements for existing electrical installations requiring certification.

1.1.3 The Code does not include the inspection and testing requirements for connectable installations of vehicles, relocatable buildings or pleasure craft.

1.1.3.1 For vehicles and relocatable buildings the requirements of electrical Code of Practice ECP 1 apply.

1.1.3.2 For pleasure craft the requirements of electrical Code of Practice ECP 29 apply.

1.1.4 The Code does not contain all criteria for work requiring inspection.

1.2 INTERPRETATIONS

In this Code, unless the context otherwise requires:

1.2.1 Fitting - means an item of electrical equipment that forms a termination point for the fixed wiring of an installation.

1.2.2 Inspection - means the visual examination of the electrical equipment of an installation to provide a judgement on its compliance with set criteria.

1.2.3 Protective device - means an item of electrical equipment that interrupts the flow of electricity to a circuit or part of a circuit under adverse conditions of overload, short circuit or leakage to earth.

1.2.4 Testing - means the carrying out of a checking procedure, with or without instruments.

1.2.5 TPS (Tough Plastic Sheathed) - means a form of fixed wiring cable having a sheath of PVC (polyvinyl chloride).

1.2.6 TRS (Tough Rubber Sheathed) - means a form of fixed wiring cable having a sheath of rubber.

1.2.7 VIR (Vulcanised India Rubber) - means a form of fixed wiring cable consisting of a rubber insulated conductor with a cover of wax impregnated cloth.

1.3 GENERAL

1.3.1 Electrical work shall be inspected and tested to ensure that:

(a) Persons are protected against danger from direct and indirect contact with live parts of the work;

(b) The electrical installation is so arranged that there is no risk of ignition of flammable materials due to high temperatures or electric arc.

(c) Persons are protected against injury and property is protected against damage due to excessive temperatures or electromechanical stresses resulting from overcurrents likely to arise in the work.

(d) Persons are protected against injury and property is protected against harmful effects of faults which could occur by live parts of circuits supplied at different voltages.

(e) Fittings and electrical appliances are able to withstand safely the stresses and environmental conditions characteristic of their location by either their design or by the method of their installation.

1.3.2 The inspection and testing need only be carried out in respect of work which is required to be certified.

1.3.3 Work which has not been certified shall not be connected to a supply.

1.4 NUMBERING SYSTEM OF THIS CODE

1.4.1 Sections are numbered 1 to 7.

1.4.2 Subsections are numbered by one full stop between numbers. (eg: 1.6)

1.4.3 Clauses are numbered by two full stops between three numbers. (eg: 2.1.2)

1.4.4 Subclauses are numbered by three full stops between four numbers. (eg: 3.3.1.1)

1.4.5 Paragraphs contain numbering punctuated by one or more full stops together with a parenthesised letter.

SECTION 2

CERTIFICATION REQUIREMENTS

2.1 GENERAL

2.1.1 Certification is carried out to confirm to the client that an installation or any electrical work carried out on an installation complies with the appropriate inspection or testing requirements for safety.

2.1.1.1 Certification is required for:

(a) Electrical work of new installations and additions and alterations to existing installations; and

(b) Electrical work requiring inspection as specified in subclause 4.1.1.

2.1.1.2 Certification may be provided for existing installations on which no electrical work has been carried out but for which certification is required.

2.1.2 A certificate of Compliance shall only be issued in respect of an installation or part of an installation which has been inspected and tested in accordance with this Code and has been shown to be compliant with the requirements.

2.1.3 On completion of certification the person certifying shall give a copy of the certificate to the client.

2.1.4 An example of a form for certification is laid out in the First Schedule to this Code.

SECTION 3

TESTING REQUIREMENTS

3.1 GENERAL

3.1.1 Electrical work shall be tested to confirm that the work has been carried out in accordance with the relevant electrical safety regulations, Codes of Practice and standards.

3.1.2 Equipment used for testing shall:

(a) Be checked prior to testing to ensure that it is in good working order; and

(b) Be used in accordance with its design operating criteria.

3.1.2.1 During testing precautions shall be taken to ensure persons will not be subjected to electric shock from test equipment connected to the installation.

3.1.3 The testing of work shall include visual checks, insulation resistance tests, polarity checks and earthing resistance and earth continuity tests.

3.1.4 Electrical appliances and fittings forming part of the installation which may be damaged by test voltages may be disconnected or bypassed as appropriate before testing is carried out.

3.2 TEST CHECKS

3.2.1 Testing of electrical work shall include visual checks that:

(a) Access to live parts and to basic insulation is not possible without the use of a tool.

(b) Cables, fittings and electrical appliances forming part of the fixed installation are not damaged.

(c) Conductors of cables are correctly identified and are connected to the correct terminals of fittings.

(d) Conductors are securely held in terminals of fittings and are not subject to tension at the terminations.

(e) Fittings and conductor sizes match the expected load, voltage of the supply and the rating of the protective device of the circuit to which the fitting or conductor is connected.

(f) There is adequate insulation and distance between live conductors and live conductors and earth.

(g) Fittings and cables are adequately supported.

(h) Fittings and cables are designed for the environment in which they are located or are suitably enclosed.

(i) Fittings, cables and electrical appliances are protected against electrical faults.

(j) Fixed wired electrical appliances requiring earthing (Class 1) is connected by a cable or flexible cord having an earth conductor.

3.2.2 Testing requirements for switchboards shall include visual checks that:

(a) The current rating, fusing factor and/or breaking capacity of protective devices are appropriate to the circuits they protect.

(b) Switches and protective devices are labelled as to the type of circuit they control or protect.

(c) Live conductors are insulated, even when access is by the use of a tool, to prevent inadvertent contact with live parts and from earth.

(d) Neutral busbars are insulated from earth.

(e) Earth continuity conductors are connected to the earth bar and neutral conductors are connected to the neutral bar.
The earthing lead from the earth electrode is connected to the appropriate busbar.

(f) There is a link between the earth and neutral bars at the main switchboard.

(g) Residual current devices installed for personal protection have a residual operating current of 30mA or less.

3.2.3 Testing requirements for fixed wired electrical appliances shall include visual checks that:

(a) Where located in a damp situation or adverse temperature situations they are correctly positioned and are suitable for that location.

(b) Connection to the fixed wiring is correct and where connected to the fixed wiring by a flexible cord, the cord is anchored at both the electrical appliance and the supply fitting.

(c) Electrical appliances are correctly mounted.

(d) Single phase electric ranges are connected to the supply by a plug and socket of appropriate rating.

3.2.4 Testing requirements for the main earthing of an installation shall include visual checks that:

(a) The earthing lead is of the correct size.

(b) At the earth electrode position, the correct warning label is fitted.

3.3 INSULATION RESISTANCE TESTING

3.3.1 Insulation resistance tests shall be carried out to ensure that the insulation between parts of different polarity and between live parts and earth is adequate.

3.3.2 Testing shall be carried out with an insulation resistance tester with minimum test voltages of:

(a) 500 Volts for circuits with operating voltages of up to 250 volts between phase and earth.

(b) 1000 volts for circuits above 250 volts between phase and earth.

3.3.3 Insulation resistance tests shall be made between:

(a) Phase conductors.

(b) Phase and neutral.

(c) Phase and earth.

(d) Neutral and earth.

3.3.3.1 Tests on electrical appliances, where required, shall be carried out with the appliance isolating switch off.

3.3.4 Values of insulation resistance recorded during tests shall not be less than:

(a)	A cable	20 megohms
(b)	An installation	1 megohm *

* This resistance may be reduced for fixed wired appliances containing heating elements which may have been subjected to moisture absorption such as water heaters and cooking appliances, provided that an insulation resistance of at least 10,000 ohms is obtained for the appliance as a whole.

3.4 POLARITY TESTING

3.4.1 Polarity tests shall be carried out to ensure that fittings and cables are correctly connected to the supply.

3.4.2 Tests shall confirm that at socket-outlets, the phase and neutral of the supply is connected to the appropriate contacts.

3.5 EARTH CONTINUITY TESTS

3.5.1 Earth continuity tests shall be carried out to ensure that:

(a) The connection of the earthing lead between the main switchboard and the earth electrode is continuous and of low resistance.

(b) The connection between any point on the installation required to be earthed and the earth busbar is continuous and of low resistance.

3.5.2 The value of resistance recorded in earth continuity tests shall be no greater than 0.5 ohm.

3.6 BONDING

3.6.1 Bonding effectiveness shall be tested between exposed metal of an installation.

3.6.1.1 The resistance value of bonded exposed metal to the earth electrode shall be no greater than 0.5 ohm.

3.7 SAFETY EQUIPMENT

3.7.1 The correct operation of residual current devices shall be verified.

3.7.1.1 For residual current devices installed for personal protection with the use of electrical appliances their operation shall be verified as:

(a) At rated residual current for an a.c. fault, the devices operate to disconnect the supply within 300 milliseconds.

(b) At 5 times the rated residual current for an a.c. fault, the devices operate to disconnect the fault within 40 milliseconds.

(c) At 1.4 times the rated residual current for a pulsating d.c. fault, the devices operate to disconnect the fault within 300 milliseconds.

(d) At 7 times the rated residual current for a pulsating d.c. fault, the devices operate to disconnect the fault within 40 milliseconds.

3.7.2 Isolating transformers permanently connected to the fixed wiring shall be tested to ensure that there is segregation between the output and earth.

3.7.2.1 The insulation resistance between the phase and neutral of the primary winding to the secondary winding shall be not less than 50 megohms.

3.7.2.2 For any socket-outlet supplied from an isolating transformer the insulation resistance between the earth contact of the socket-outlet and earth shall be not less than 50 Megohm.

SECTION 4

INSPECTION REQUIREMENTS

4.1 GENERAL

4.1.1 Inspection is required for:

(a) High voltage installation work on consumers premises:

(b) Installation work in locations which have been classed as hazardous because of explosive or flammable gases, vapours or dusts:

(c) Installation of new mains, new main switchboards and new earthing systems, and earthing leads:

(d) Installation of co-generation control equipment:

(e) The installation of electrical fittings and medical equipment in patient care areas of hospitals and patient care premises:

(f) Electrical stunning and electrical meat conditioning equipment:

(g) Existing installations where certification of the installation is required.

4.1.1.1 For electrical installations in hazardous areas the requirements of ECP 24 apply.

4.1.1.2 For electrical installations in electromedical areas the requirements of ECP 12 apply.

4.2 INSPECTION CHECKS

4.2.1 Inspection of electrical work shall verify, by visual checks and the use of test equipment, that the electrical work meets minimum safety criteria for the connection of the electrical work to the supply.

4.2.2 Inspection of fittings and conductors, including new mains, shall include checks that:

(a) Access to live parts and/or to basic insulation is not possible without the use of a tool.

(b) There is no visible damage to cables, fittings and electrical appliances forming part of the fixed installation.

(c) Fittings and conductor sizes match the expected load, voltage of the supply and the rating of the protective device on the circuit.

(d) There is adequate distance between live conductors and fittings and between live conductors and earth (such as overhead lines and busbars).

(e) Fittings and cables are adequately supported (within 2 m of a manhole etc).

(f) Fittings and cables are designed for the environment in which they are located or are suitably located and protected (damp areas, mechanical damage).

4.2.3 Inspection requirements for switchboards, including new switchboards, shall include checks that:

(a) The current rating, fusing factor and/or breaking capacity of protective devices are appropriate to the circuits they protect.
(b) Switches and protective devices are labelled as to the type of circuit they control or protect.
(c) Live conductors are insulated and neutral busbars are insulated from earth.
(d) Earth continuity conductors are connected to the earth bar and neutral conductors are connected to the neutral bar.
(e) The earthing lead is connected to the appropriate busbar.
(f) There is a link between the earth and neutral bars at the main switchboard.
(g) Residual current devices installed for personal protection have a residual operating current of 30mA or less.

4.2.4 Inspection requirements for fixed wired electrical appliances shall include checks that:

(a) Where located in a damp situation or adverse temperature situations they are correctly positioned and are suitable for that location.
(b) Connection to the fixed wiring is correct and where connected to the fixed wiring by a flexible cord, the cord is anchored at both the electrical appliance and the supply fitting.
(c) Electrical appliances are correctly mounted.
(d) Single phase electric ranges are connected to the supply by a plug and socket of appropriate rating.

4.2.5 Inspection requirements for main earthing, including new main earthing of an installation, shall include checks that:

(a) The earthing lead is of the correct size.
(b) At the earth electrode position the correct warning label is fitted.
(c) The earthing lead is correctly connected at the switchboard.

SECTION 5

PARTICULAR REQUIREMENTS

5.1 WORK BY TRADESPERSONS

5.1.1 Electrical work carried out by tradespersons shall be tested in accordance with the requirements of Section 3.

5.1.1.1 Test checks shall be conducted either during the carrying out of electrical work or upon completion of any electrical work.

5.1.1.2 Tests of insulation resistance, polarity, earth continuity, bonding and safety equipment shall be carried out following completion of any electrical work.

5.2 WORK BY OWNERS OF DOMESTIC PREMISES

5.2.1 Prior to testing and certification the inspector shall have received verification from the owner that the electrical work has been carried out in accordance with ECP 51.

5.2.2 A random selection of the work to be certified shall be tested in accordance with Section 3 and this shall include:

(a) 25% of the socket-outlets and 25% of lighting points; and
(b) All socket-outlets with a rating of more than 10 amps; and
(c) All switchboards; and
(d) The connection of all fixed wired electrical appliances; and
(e) All fittings and personal protective devices associated with damp situations.

5.2.3 Installations or parts of installations which have been certified may be connected to the supply by the inspector.

5.3 WORK REQUIRING INSPECTION

5.3.1 Installations containing work which requires inspection, shall be:

(a) Tested by the person carrying out the electrical work, in accordance with the requirements of Section 3 for work which does not require inspection, and the requirements of relevant electrical Codes of Practice and official standards for work requiring inspection.
(b) Certified by the person carrying out the work as meeting the requirements of the Electricity Regulations 1993.
(c) Inspected by a registered inspector in accordance with the relevant requirements of Section 4, the electrical Codes of Practice and official standards for the particular listed work concerned.

5.3.2 Prior to inspecting the electrical work the registered inspector shall have received verification from the person carrying out the work, that it has been done in

accordance with the Electricity Regulations.

5.4 EXISTING INSTALLATIONS

5.4.1 Testing and inspection of the electrical installation shall be carried out by a registered inspector in accordance with clauses 3.3 to 3.7 of Sections 3 and Section 4 of this Code.

5.4.2 If the inspection and test reveals an electrical hazard the client and the electricity supplier shall be notified**.**

5.4.3 In carrying out inspection and testing the aspects of an existing installation requiring particular checking are:

(a) TRS (Tough Rubber Sheathed) or VIR (Vulcanised India Rubber) cables shall show no undue evidence of insulation or sheath deterioration.

(b) The exposed portion of the earth electrode shall show no evidence corrosion, damage or poor connection of the earthing lead which could affect the effectiveness of the earthing system.

(c) Socket-outlets shall have no mechanical damage and there shall be no visual evidence of overheating or spreading of contacts.

(d) Lamp holders shall have no evidence of mechanical damage or undue evidence of overheating or arcing.

(e) Switchboard wiring and components shall have no deterioration of cable insulation and fuses and switches no evidence of mechanical damage. Semi enclosed rewirable fuses, where fitted, shall not have deteriorated due to arcing.

(f) Overhead lines and the entry points into buildings shall have no undue evidence of insulation deterioration, rusting of anchorages or deterioration of line connection boxes.