



NSW Government

Department of Water & Energy

CODE OF PRACTICE

INSTALLATION SAFETY MANAGEMENT



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1. PREFACE

The Electricity Supply Act intends reforms of many activities undertaken by Electricity Distributors, with a view to introducing competition for those activities. The resulting cost savings will be translated to reduced electricity charges, improving the competitive position of Australian industries in the global marketplace.

The philosophy central to the Act is to bring about competition as unfettered by regulation as possible, allowing the widest possible expression of innovation in business processes. The Act prescribes desired outcomes rather than processes and it has been decided that codes of practice which conserve this approach are to be produced for electricity distributors so that they may determine for themselves the methods by which they comply with the Act's intent.

The policy intent of the Act reflected through being a condition of Licence, is that electricity distributors are required to adopt and implement a cost effective programme for audit and management of compliance by electrical contractors with safety standards for electrical work on customers' installations. Powers of inspection and related powers required to implement such a programme are conferred on electricity distributors by the Electricity Safety Act. This Act also specifies the licensing requirements for electrical workers, the standards required for electrical work and the duties of electrical contractors to comply with them.

In this Code then, the prescription intended by the Electricity Supply Act is limited to that required to specify fundamental outcomes, allowing each electricity distributor the freedom to determine as best as is seen fit, the business processes needed to produce those outcomes.

For further information on the provisions of this Code contact the Department of Energy and Water or the local electricity distributor. Comments are welcomed and should be sent to:

Manager Energy Networks Performance Policy
Department of Water and Energy
Level 17, 227 Elizabeth Street
SYDNEY NSW 2001

Phone: 02 8281 7777

Email: information@dwe.nsw.gov.au



2. APPLICATION AND OBJECTIVES

This code covers the minimum practices necessary for implementation by electricity distributors in managing the safety of customers' electrical installations. It intends that regardless of the installation safety management systems implemented by electricity distributors, safety standards as measured by documented indicators will either remain at the present level or improve.

3. INSTALLATION SAFETY MANAGEMENT PRACTICES

3.1 Due Diligence

An electricity distributor shall exercise due diligence in managing the safety of electrical installation work performed on customers' electrical installations. In the present context, this is considered to have been demonstrated when installation safety management is achieved through implementing and acting upon a quality system. Due diligence refers to a minimum standard of care that in the circumstances, would have been reasonable to expect of a reasonable person, who has responsibilities, experience and skills in the system.

In order to establish due diligence, it is considered necessary to ensure that:

- (a) all relevant risks or compliance issues are identified;
- (b) there is an accurate and proper system in place for ensuring compliance;
- (c) there is adequate and proper supervision of the system including:
 - (i) generation of information;
 - (ii) reporting of relevant information to the manager;
 - (iii) consideration and appropriate action taken by the manager and
 - (iv) education and training of employees;
- (d) these adequate and proper systems are reviewed to ensure continued implementation of all compliance issues.



The working group considers that the concept of due diligence should be included in the Code. The above clause has been constructed following consideration of legal opinions given when due diligence had been challenged and definitions found necessary to clarify the issues.

3.2 Plan

An electricity distributor shall develop, document and implement a plan for management of installation safety. The plan shall contain objectives and targets, be monitored, controlled and shall initiate corrective action shown to be necessary following periodic review. It shall be part of an electricity distributor's system of managing installation safety which is referred to as "the system" in this Code.

3.3 Reporting

An electricity distributor shall report progress against the plan's objectives

- (i) to the Minister at a frequency to be determined, and
- (ii) to the public by way of the electricity distributor's annual report.

The minimum performance indicator shown by the report shall be the major safety breach rate discovered during inspection. Appendix 1 shows a pro-forma to be used as the reporting basis starting point.

It is necessary that electricity distributors report progress against their plan to the Minister at a frequency yet to be determined. No doubt this frequency could be proposed by electricity distributors as they produce their own programmes.

In considering the subject of the reports, it is evident that performance indicators relevant to installation safety will be needed. In addition, the Government on behalf of the community will expect delivery across the State of uniform safety levels not below those currently prevailing. Accordingly it is considered that the existing performance measures as reported to the DoE by electricity distributors will be the base on which future performance indicators are derived. These statistics report the number of breaches discovered during inspection of installation work, historically in categories of major and minor breaches. Appendix 1 of this Code shows the result of an adaptation of the pro-forma developed as part of reforms implemented in 1992, intended for use by electricity



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distributors and the DoE as a starting point in arriving at a satisfactory reporting arrangement.



In most cases, accidental electric shock results from the occurrence of two or more failures in an installation, first being the failure of one of the essential safety features of the installation, such as the MEN link, and the second such as insulation failure in an appliance. A major safety breach occurs when an essential safety feature of an installation is non functional, meaning that were it connected to supply only one instance of misadventure will result in danger, or because the installation as found contains installation safety breaches which render it unconditionally dangerous.

Progress with the reforms of 1992 has led to concentration on the “major” category of safety breach as an indicator of the overall safety performance of the contracting industry. It is considered that the major safety breach should be the minimum subject of reporting against progress of the electricity distributor’s plan. The two categories may however need to be maintained in order to reference future statistics against the old ones, as a means of indicating maintenance of safety standards.

3.4 Risk Management Strategy

An electricity distributor’s plan shall include a risk management strategy. This strategy shall include, but not be restricted to;

- identifying risks and implementing effective risk management actions,
- assessment of data from an effective safety measurement system,
- assessment of the consequences of failures of the system,
- a periodic review,
- a corrective action arrangement.

3.5 Standard of Installation Work

The system put into place by each electricity distributor will ensure that installation work as executed will comply with the appropriate Australian Standards.

3.6 Work to be Tested

All installation work carried out shall be tested to the requirements of the appropriate Australian Standard and a test report completed. Tests required to be carried out are listed in Appendix 2.



A major platform on which the existing system rests is that installing contractors test their completed work as required under the Australian Standard for electrical testing and complete a test report. The effect of this has been to make contractors more aware of the safety consequences of poor workmanship, as well as to reduce the need for follow-up inspections, both major improvements over previous circumstances. At present there are still many contractors who do not adequately test their work and this shortcoming needs to be considered by the new arrangements.

3.7 Work to be Notified

An electricity distributor shall ensure that an installing contractor notifies it and the owner of the customer's installation, of the installation work and of the relevant test results, using the industry accepted pro-forma. The notification shall be made within 14 days of the work's having been completed and tested.

For reasons of system augmentation and account creation the electricity distributor needs to be notified of the existing or intended connection of additional load. The audit and safety management requirement of the Act indicate the electricity distributor's further need of such notification and for these purposes, the test report prepared after completion of the installation work needs to be included. The accepted pro-forma currently in use should continue to be the vehicle for these actions.

Thus advice of all installation work needs to be directed to the electricity distributor along with the required test report, while the same advice also needs to be provided to the agency which is to perform inspection of the installation to the level determined by the electricity distributor.

The previous reform put in place an arrangement whereby the installing contractor was required to submit a copy of the notification to the owner of the customer's installation containing the installation work. The intent of this was to reinforce the need for the contractor to have the requisite tests carried out on the work, to reveal any shortcomings, to enable the contractor to remedy the situation before notification and to relieve the electricity distributor's staff of additional administrative costs in effecting the remedy. This situation should prevail.



3.8 Inspection

The electricity distributor's safety management system shall include inspection of installations and installation work within 3 months of receipt of notification, at levels which contribute to maintaining or exceeding existing minimum safety outcomes.

An electricity distributor shall ensure that the following installation work receives independent inspection, unless a documented contrary decision is made, which rests upon a quality system incorporating the documented satisfactory record of the installing electrical contractor.

Consumers mains and main switchboards,
High voltage installations, and
Installations in environments classified as hazardous areas by relevant Australian Standards.

The recent past has seen some electricity distributors divest themselves of those parts of their business involving competition for installation contracting, while others have commenced an expansion of such activities. Because at present there are no externally recognised installation inspectors, electricity distributors will need to exercise care that future inspection services are demonstrably independent.

For the vast majority by number of new installations, the reforms of 1992 mandated the inspection of consumers mains and main switchboards. In so doing, they ensured that the essential safety features of the installation were in fact compliant and as these features are not usually subject to interference and misadventure, once having established them, confidence exists as to the safety of the overall installation into the future.

These same reforms mandated inspection of the high voltage sections of a high voltage customer's installation as well as those installations which because of their intended use in a particular environment offer the hazard of explosion. This is because of the significantly greater danger which exists in those fields, as well as the general lack of specialist knowledge needed for hazardous area work.

Under the 1992 reforms, the balance of installation work receives inspection at a reduced level, being selected by deliberative process rather than at random. Through monitoring contractor performance, these latter inspections are intended to maintain or improve the general safety levels in the industry.



Although the installing contractor's responsibility cannot be reduced, the working group considers that this area presents electricity distributors with the greatest risk exposure and has concluded that the above clause places the matter in context.

3.9 Remedy of Work Containing Safety Breaches

The system shall ensure the remedy of the major safety breaches that are listed in Appendix 3.

A system of ensuring the rectification of defective work needs to be put in place and should this involve a reinspection it is expected that the electricity distributors' intent would be to charge on a full cost recovery basis.

3.10 Connection to Supply

An electricity distributor's system shall ensure that installation work containing major safety breaches as listed in Appendix 3 to this Code is not connected to supply, or if found connected, be disconnected.

Arrangements currently in place do not allow the connection to supply of installation work which because of its non compliance is likely to offer hazard. In generating alternative systems for managing installation safety, electricity distributors will need to ensure that this situation prevails.

3.11 Audit Inspections

The electricity distributor shall include in the system an audit inspection programme for the management of compliance with legislation, standards and service rules, of installations, installing contractors and inspectors and as a check on the operation of the installation safety management system. The audit frequency shall be at levels which contribute to maintaining or exceeding existing minimum safety outcomes. The audit shall be demonstrably independent, to ensure that conflicts of interest do not arise.

The creation of a system of audit inspection is clearly a responsibility of electricity distributors. The audit function could be directly carried out by electricity distributors or contracted out to accredited audit inspection facilities. The audit programme would involve inspection of in service works, not only to gauge their compliance, but to gauge



3.12 Corrective Action

In the event of a failure of the system in the areas of installation safety, contractor or inspector performance or the system itself, the electricity distributor shall take corrective action.

This corrective action shall include a range of disciplinary action against contractors whose history of major safety breaches warrants. This action may be through cooperation with the Department of Fair Trading, or through the Commercial Tribunal.

In the event of a failure or potential failure of the system in the areas of installation safety, contractor or inspector performance or the system itself, corrective action will be necessary.

In the area of disciplinary action against errant contractors, the following situation pertains. Coincident with the commencement of the 1992 regulation governing installation safety, a tribunal (the Building Services Corporation) was empowered to deal directly with electrical contractor and worker breaches, both in safety and in the aesthetics of workmanship. This initially had a beneficial effect on industry standards, but the tribunal has since been required to pursue its disciplinary objectives through commercial tribunals and the costs and delays have rendered its activities in the electrical field of much lesser effect. Although electricity distributors have the power to invoke the regulations against errant contractors, the cost of the commercial tribunal process and the previous presence of the tribunal led to almost no such action being taken.

The principal advantage of the tribunal was that it directly threatened a contractor's livelihood through license suspension, while civil courts remain averse to this action because of the prospective loss of income that license revocation causes. The body with responsibility for electrical workers' licensing today is the Department of Fair Trading (DFT) and it is considered that electricity distributors would be better off cooperating with that body to threaten licenses than to undertake actions through Commercial Tribunals without likelihood of effecting a remedy.

Discussions with officers of the DFT indicate that it will produce guidelines for electricity distributors that will indicate the format of material required by that body for use in achieving cost effective disciplinary action for errant contractors. A further indication given by



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the DFT was that electricity distributors can expect an increase in the number of actions taken against contractors.



3.13 Qualifications of Inspectors

Electricity Distributors shall within 12 months cause to be produced a competency standard and training courses for installation inspectors. This may be as a result of their own direct efforts or through their supervision to completion of the efforts of interested and competent parties.

The qualifications of persons in employment as inspectors prior to specification of competencies and training are recognised. From the time a competency standard and training courses have been produced, twelve months unemployment as an inspector is the limit before assessment of competence against the standard is required for future employment.

It seems likely that some inspectors will in future be employed as contractors in the private sector, some will remain with electricity distributors, while some as auditors will inspect completed installation work, not only to determine its compliance but to determine the compliance of the contractors and inspectors who have together put the work into service. This leads to consideration of the competencies of future inspectors, as to date there is no external course whereby prospective inspectors can secure a qualification. A competency standard and training course needs to be specified, as in time, a shortage of qualified persons would lead to a deterioration of safety standards and the requirement to deliver acceptable levels of community safety would not be achievable. Bodies at present qualified to specify competencies are the electricity distributors and a combination of the National Electrical Contractors Association and the Institute of Electrical Inspectors.

Persons currently in employment as inspectors should have their qualifications recognised. From the time a competency standard and training courses have been produced, twelve months unemployment as an inspector should be the limit before assessment of competence against the standard is required before employment proceeds.



4. DEFINITIONS

(TO BE INSERTED AT A LATER DATE)



APPENDIX 1

INSTALLATION SAFETY MANAGEMENT PROGRESS REPORT

ELECTRICITY DISTRIBUTOR _____

PERIOD OF REPORT _____

NUMBER OF NOTIFICATIONS OF ELECTRICAL WORK RECEIVED _____

NUMBER OF INSPECTIONS PERFORMED _____

NUMBER OF INSPECTIONS OF ESSENTIAL SAFETY FEATURES
DELEGATED TO CONTRACTORS _____

INSPECTION FINDINGS

Safety breach Notices issued _____

Nature of Major Safety Breaches

- A) Exposed live parts _____
- B) Earthing System _____
- C) Insulation Resistance _____
- D) Overloaded Equipment _____
- E) Overcurrent/Residual current protection _____
- F) Polarity _____
- G) Unsuitable Equipment _____

NUMBER OF AUDITS PERFORMED _____

AUDIT FINDINGS _____

SHOCK INVESTIGATIONS ON CUSTOMERS' INSTALLATIONS
NUMBER

DISCIPLINARY ACTION TAKEN

- A) Warnings issued _____
- B) Reports to Department of Fair Trading _____

COMMENTS Relating to the performance of Contractors, Inspection and Audit programmes, expected progress during the next report period and corrective actions.



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APPENDIX 2

TESTING CRITERIA

Before being connected to supply, all work shall be tested by the installing contractor, or another properly qualified and authorised person, to check its compliance with the relevant Australian Standards and its safe operation.

Tests shall ensure;

- (a) that there is earth continuity and that the earth resistance is safe;
- (b) that the insulation resistance is safe;
- (c) that polarity is correct;
- (d) that there is no transposition of earthing and neutral conductors;
- (e) that there is no short circuit between conductors;
- (f) that there is no intermix between conductors of different circuits;
- (g) that switchboard equipment is correctly marked to indicate:
 - (i) the corresponding active and neutral connections for each circuit;
 - (ii) the relationship of the equipment to the various sections of the installation work;
- (h) that the number of wiring points connected to each circuit does not exceed the maximum permitted by the relevant Australian Standard;
- (i) that the installation work will operate in the manner intended by the parties who agreed or arranged for it to be carried out.



APPENDIX 3

MAJOR SAFETY BREACHES

For the purpose of this Code of Practice, major safety breaches are regarded as those departures from AS 3000 SAA Wiring Rules, which are dangerous to life, health or property. In general the following types of safety breaches are to be regarded as major safety breaches:

a) **Exposed live parts**

- exposed live terminals on accessible equipment.
This does not include lampholders and fuse bases.
Accessible shall be taken to mean access by unauthorised persons, without the use of a tool or key.
- exposed conductors of unterminated or damaged cables which can be energised by the operation of a switch, or circuit-breaker or insertion of a fuse,
- bare aerial conductors in accessible positions.

b) **Earthing System**

- open circuit or high resistance (>2 ohms) from any point on the installation required to be earthed to the neutral conductor of the supply system,
- unearthed exposed metal which is in an earthed situation.

c) **Insulation Resistance**

- low resistance (<100,000 ohms) between live conductors and earthing conductors of a cable,
- low resistance (<10,000 ohms) between live parts and earthed parts of appliances which incorporate a heating element;
- low resistance (<100,000 ohms) on other low voltage equipment.



d) **Overloaded Equipment**

- socket outlets, switches, switchboard equipment, cables and accessories operating in excess of 125% of current rating,
- appliances and cables which have overheated to such an extent that serious damage or fire has occurred or could be expected to occur

e) **Overcurrent Protection and Earth Leakage Current Protection**

- no overcurrent device, or residual current device provided where required.

f) **Polarity**

- incorrect connection of active, neutral and earthing conductors at socket outlets, lampholders, switchboard equipment and appliances, isolating device not operating in active conductor(s).

g) **Unsuitable Equipment**

- equipment, exposed to the weather or other damp situations, which is not adequately protected against the ingress of water,
- equipment, installed in a hazardous location, which is not of an explosion protected type or equivalent,
- equipment used in a dangerous manner,
- equipment, installed for the supply of fire and smoke control equipment and lifts, which does not provide the required level of protection against fire & mechanical protection.