SRI LANKA STANDARD 703 : PART 1 : 1998
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CODE OF PRACTICE FOR ELECTRICAL INSTALLATIONS

PART 1 : SMALL RESIDENTIAL BUILDINGS (FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

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Gr. 5

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Sri Lanka.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

Sri Lanka Standard
CODE OF PRACTICE FOR ELECTRICAL INSTALLATIONS
Part 1 : Small residential buildings
(First Revision)

FOREWORD

This code was approved by the Sectoral Committee on Electrical Installations and was authorized for adoption and publication as a Sri Lanka Standard Code of Practice by the Council of the Sri Lanka Standards Institution on 1998-02-12.

This is the first revision of **SLS 703 : 1985** and is presented in three parts namely :

Part 1 Electrical installations in small residential buildings
Part 2 Electrical installations in larger buildings including flats, commercial and office buildings
Part 3 Electrical installations in industrial buildings

This code of practice covers electrical installations where the system voltage does not exceed 1000 V a.c. The code aims to provide information on matters of common interest to engineers, architects, building contractors and others concerned. This code is intended chiefly to lay down requirements regarding design, quality of materials and installation practices.

The Electricity Act. No. 19 of 1950 sets out the legal requirements for the regulation of generation, transmission, transformation, distribution, supply and use of electrical energy in Sri Lanka. The Regulations under this Act require that all electrical installations should conform to the Wiring Regulations of the Institution of Electrical Engineers of the United Kingdom.

All users of this code should recognize the inherent dangers, such as fire and shock, in the usage of electricity.

All values in this code are given in SI units.

In the preparation of this standard, the assistance derived from **BS 7671 : 1992** (incorporating Amendment No. 1 : 1994), Requirements for Electrical Installations, IEE Wiring Regulations Sixteenth Edition (This document herein after is referred to as IEE Wiring Regulations) published by the British Standards Institution and the Institution of Electrical Engineers of the United Kingdom is gratefully acknowledged.

1 SCOPE

This part of the code sets out the requirements for the electrical installations in small residential buildings. The supply to be used in these buildings is single phase with a nominal voltage between phase and neutral conductors of 230 V a.c. 50 Hz.

2 REFERENCES

IEC 269 Low voltage fuses

3 DEFINITIONS

For the purpose of this code the following definition shall apply.

3.1 small residential building : A building not exceeding 100 square meters in floor area and intended for residential purposes.

4 ABBREVIATIONS

4.1 ELCB : Earth Leakage Circuit Breaker

4.2 MCB : Miniature Circuit Breaker

4.3 MCCB : Moulded Case Circuit Breaker

4.4 RCD : Residual Current Device

5 REGULATORY REQUIREMENTS

The Electricity Act No. 19 of 1950, and the Subsidiary Legislation under the Act, which may be cited as Electricity Regulations 1951, require that electrical installations in Sri Lanka conform to the IEE Wiring Regulations, subject to such additions or modifications to meet local conditions as may be made from time to time by the Chief Electrical Inspector and published in the Gazette (see Appendix A).

6 SAFETY REQUIREMENTS

6.1 Good workmanship and proper materials shall be used.

6.2 All equipment used in the installation shall have voltage and current ratings suitable for their intended purposes.

6.3 All conductors shall be of sufficient size and current carrying capacity for the purposes for which they are intended.

6.4 All wiring in the installation shall be continuous, and free of joints.

6.5 To prevent danger every installation shall be :

a) protected against over current ;
b) protected against earth fault current ; and
c) provided with a means of isolation.

6.5.1 *Protected against over current*

For this purpose any of the following protective devices may be used.

a) Moulded Case Circuit Breakers.
b) Miniature Circuit Breakers.
c) Fuses.

Where fuses are used cartridge fuse complying with **IEC 269** or equivalent standard is recommended. The protective device should be rated for the nominal voltage and the required current rating and should be of adequate fault current rating.

6.5.2 *Protected against earth fault current*

For this purpose the installation should be earthed and one or more Residual Current Devices should be used.
Earthing means connecting all metal work associated with the installation to a main earthing terminal and connecting it to a suitable earth electrode.
The residual operating current of the Residual Current Device should not exceed 30 mA.

6.5.3 *Provided with a means of isolation*

This shall be provided by means of an isolator, a main switch or a circuit breaker, all having adequate contact separation.
The isolation device should not be located in places where access may be difficult at times of emergency.

NOTE

*The main switch or circuit breaker mentioned in **6.5.1** and **6.5.2** above may also be used as an isolating switch in times of emergency, and hence it should be readily accessible. The location of such switches in rooms, pantries etc., where access may be denied in times of emergency, is not recommended.*

6.6 All equipment likely to be exposed to the weather, corrosive atmosphere or other adverse conditions, shall be so constructed or protected as may be necessary to prevent danger resulting from such exposure. All equipment in surroundings susceptible to the risk of fire or explosion shall be so constructed, and such other special precautions taken, as necessary to prevent danger.

6.7 No addition or alteration, temporary or permanent, may be made to an existing installation unless it has been ascertained that the rating and condition of any existing equipment, including that of the electricity supply authority, which has to carry the additional load, is adequate for that purpose, and that the earthing arrangement is also adequate.

7 EXCHANGE OF INFORMATION

7.1 Consultation between the owner and all the contracting parties is essential to ensure that suitable provision is made for electrical and all other services that will ultimately be required when the building is fully occupied.

7.2 In agreeing on the point of termination of the incoming electricity supply , it is important to bear in mind that the terminating and metering equipment need to be protected from the weather and other environmental hazards. It is also essential to have access to such terminating and metering equipment at all times, for purposes such as maintenance, meter reading and emergency isolation. The main switch of the consumer's installation may be omitted on condition the Supply Authority grants permission for the use of their circuit breaker for the purpose of isolating the installation.

8 SUPPLY INTAKE ARRANGEMENTS

8.1 Electrical service connections are provided by the Supply Authority to small residential buildings either by underground cable or overhead conductor. The service may either be underground or overhead depending upon the Supply Authority's distribution system in the vicinity of the premises.

8.2 The supply Authority's service connection ends in a meter and it is the responsibility of the Supply Authority to maintain the service connection and the meter in a safe and proper condition. The user is therefore advised to refrain from accessing the Supply Authority's equipment.

9 MATERIALS, COMPONENTS AND EQUIPMENT

The materials, components and equipment used shall conform to the relevant Sri Lanka standards or standards of the International Electrotechnical Commission.

10 DESIGN

10.1 General

10.1.1 The planning and design of an electrical installation should give special consideration to the needs of the end users, whilst conforming to this code.

10.1.2 The matters to be considered in the design stage are :

a) the type of supply (230 V, 50 Hz a.c., two wire with neutral earthed at Supply Authority's transformer);
b) short circuit level of the origin of the installation;

NOTE

This information may be obtained from the Supply Authority.

c) the minimum and maximum expected ambient temperatures;
d) abnormal levels of moisture, salt-laden atmosphere, corrosive gases, etc;
e) anticipated changes to the installation in the short term, say five years;
f) method of wiring; whether in embedded conduit, surface conduit, wooden or PVC or other plastic surface casing and covers;
g) location of distribution boards, switches, socket outlets, fan regulators and similar fittings in relation to the living space. Special attention should be paid to ensure that electrical fittings are normally not accessible to very young children. Further, care should be exercised in the positioning of switches, socket outlets, etc. in relation to doors, windows, columns and other structural features;
h) use of energy efficient luminaires and appliances; and
j) use of two-way switches;

10.2 Circuits

10.2.1 To facilitate safe inspection and testing, operation, maintenance and to avoid danger in the event of a fault, every installation shall be divided into several final circuits. These final circuits may be single phase or three phase.

10.2.2 The wiring of each final circuit (i.e. the line or phase conductor, the neutral conductor, and the earth conductor) shall be electrically separate, from that of every other circuit, so that, when such final circuit is isolated, it cannot be energized inadvertently, or indirectly, through some other circuit.

10.2.3 The phase conductor of each final circuit shall be connected to a separate way in the distribution board. The neutral conductor of each final circuit shall be connected to the neutral bar in the distribution board, and the earth conductor of each final circuit to the earth bar. To facilitate the identification of the wiring of the different final circuits, the neutral conductors and the earth conductors shall be connected in the same order in which the phase conductors have been connected.

10.2.4 A final circuit shall be used either to supply socket-outlets or lamps and ceiling fans and other individual fixed devices. Each final circuit shall extend over a particular area or zone.

10.2.5 The number of final circuits required and the number of points supplied by each such final circuit should be determined taking into account the layout of the building, and the overcurrent protection envisaged.

10.2.6 It is preferable to use 13 A socket-outlets in ring or radial circuits, as this reduces the number of ways needed on the distribution board and reduces the total length of wiring.

10.2.7 It is recommended that the following minimum number of socket-outlets be provided in the different types of rooms.:

a) Bedroom 2
b) Living Room 3
c) Kitchen/Pantry 3
d) Dining room 1

10.2.8 Special attention shall be made in respect of positioning of switches and socket-outlets etc.; such that their usage may not impair safety of the occupants.

10.3 Earthing

10.3.1 Every electrical installation shall be provided with an "Earth". Earthing is the connection of all exposed conductive parts to the general mass of earth in such a manner as to cause an immediate discharge of electrical energy to earth without danger. This will ensure the safety of persons and property in the event of a defect. (see Appendix **B**)

10.3.2 The following types of earth electrodes are allowed in a domestic installation.

a) Earth pipe
b) Earth plate

10.3.3 The material used and the construction of the electrode shall be such as to resist corrosion. The earthing conductor shall be of copper with a cross sectional area of 2.5 mm^2 or larger. The use of aluminium or copper-clad aluminium conductors for connection of the earthing terminal to the earth electrode is prohibited.

10.3.4 Every endeavor shall be made to have the earth electrode resistance as low as possible.

10.3.5 The point of connection of the circuit protective conductor to the earth electrode shall be available for inspection, testing and maintenance. The connection shall not be buried in concrete or brick work. The conductor connected to the earth electrode shall be protected against mechanical damage by enclosing it in a conduit.

11 INSPECTION AND TESTING

11.1 On completion of the electrical installation, it is essential to inspect and test the installation in accordance with the current IEE Wiring Regulations to ensure that the installation complys with the said regulations. If, at a subsequent date, any modifications, additions or alterations are carried out to the installation, a similar inspection and test must be carried out.

11.2 The installation shall first be visually inspected to:

a) check that materials and equipment comply with the appropriate Sri Lanka standard or relevant international standards; and

b) check for damage, correct mounting, tightness of bolts nuts and screws and access for safe operation and maintenance.

11. 3 Thereafter the following tests shall be carried out (where applicable), in the given sequence:

a) continuity of ring final circuit conductors;

b) continuity of protective conductors;

c) earth electrode resistance;

d) insulation resistance; and

e) polarity and phase sequence and colour coding.

11.4 Two further tests given below should be carried out after energizing the installation and before putting the installation to use.

a) Earth fault loop impedance; and

b) Operation of residual current devices (and fault voltage operated devices if any).

11.5 In the event of the Installation failing any of the above test, all the tests shall be repeated after the fault has been rectified. The main purposes of these tests is to reduce the risk of shock, burn and fire. As great care should be taken in the inspection and testing, it should be carried out only by persons authorized to do so.

APPENDIX A

The Electricity Act requires licensees (CEB, LECO and Local Supply Authorities) to provide a supply of electricity to any owner or occupier whose premises is within 46 m (150 feet) of the licensees distribution lines. This is subject to the owner or occupier making a written application for such supply, paying the cost of providing same to the licensee, and entering into an agreement in regard to paying for the energy consumed.

The Act also requires that the supply of energy should in every case be in accordance with the provisions of the Act and the Regulations made thereunder. These provisions impose certain obligations and duties on both licensees and electricity consumers.

Licensees are required to ensure that:

a) a suitable service, which includes the meter and all items right up to it is laid and maintained in a safe condition;
b) the service connection is anchored from insulators on the pole to insulators fixed firmly, and in a place inaccessible except with a ladder, on the consumers building;
c) every service line has a suitable cutout or a circuit breaker; and
d) phase and neutral conductors are readily identifiable.

The Regulations stipulate that a licensee shall not connect to his lines, installations that do not conform to the IEE Wiring Regulations. Further, that where the licensee detects defects in an installation he should notify the consumer of the defects, and ensure that they are corrected before providing supply. It is also provided that the consumer is responsible for keeping his installation in proper order.

The Act provides for settling disputes between consumers and licensees, on metering and billing matters.

APPENDIX B

In order to protect persons and property from risks associated with electricity it is necessary to have a low value of earth loop impedance. Of the various components that make up the earth loop impedance, the only one that is under the control of the consumer is his earth electrode resistance. Hence every endeavour should be made by the consumer to have his earth electrode resistance as low as possible.

The maximum value of earth electrode resistance for various final circuits is given in Table **1**.

TABLE 1 - Values of earth electrode resistances

Final circuit current **A** **(1)**	**Resistance** **Ohm** **(2)**
15	4
30	2
60	1

NOTE

If the above values of earth electrode resistances cannot be attained it is necessary to use a Residual Current Device of sensitivity 30 mA for personal protection.

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SRI LANKA STANDARDS INSTITUTION

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The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

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