

SINGAPORE STANDARD

**Code of practice for maintenance of
electrical equipment of electrical
installations**

(Formerly CP 17)



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equipment of electrical installations**

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National University of Singapore
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Foreword

Unlike mechanical installations, electrical installations produce little or no noise while in use. As such, many may tend to overlook the importance of maintenance until blackout or hazardous emergency occurs.

This Code provides useful information on the maintenance of electrical installations. Various key sections of electrical installations are dealt with in depth. For comprehensive preventive maintenance, both predictive maintenance and periodic maintenance are given due recognition.

The Code has been established through joint efforts of knowledgeable representatives from the industry, tertiary institutions, major users, electricity authority, contractors associations, and engineering services suppliers.

It is intended to establish good practice standard for the maintenance of electrical installations, to be used by maintenance personnel, Licensed Electrical Workers, property and factory owners, contractors, facility managers, electrical engineers and practitioners.

This Code was prepared by the Technical Committee on maintenance of equipment of electrical installation under the purview of the Electrical and Electronic Standards Committee. It was established as a result of the review of SS CP 17 : 1991. The former SS CP 17 served as a reference for Licensed Electrical Workers and other practitioners in the electricity industry in carrying out maintenance of high-voltage switchgear in electrical installations of up to 22 kV. Electrical installations cover only fixed installation and does not include appliances, fittings or apparatus connected to and beyond any electrical outlet where the fixed wiring terminates.

Sections One, Two and Six of this Code are intended to supersede SS CP 17 : 1991 which was prepared based on BS 6626 : 1985 and BS 6423 : 1983. Changes made to these three sections are as follows:

- Addition of a clause on normative references;
- Alignment of definitions to Electricity (Electrical Installations) Regulation 2002;
- Introduction of frequency of maintenance matrix for routine maintenance;
- Update of statutory requirements.

Section Three on power and distribution transformers refers to requirements contained in SS 516 for application, operation and maintenance of dry type power transformers. Maintenance of high-voltage cables and cable terminations is covered in Section Four.

In this Code, low-voltage switchgear and electrical equipment have also been given emphasis. Applicable requirements and tests are provided under Sections Five to Eight.

In preparing this Code, reference was made to the following publications:

BS 6423 : 1983	Code of practice for maintenance of electrical switchgear and controlgear for voltages up to and including 1 kV
BS 6626 : 1985	Code of practice for maintenance of electrical switchgear and controlgear for voltages above 1 kV and up to and including 36 kV
NFPA 70B : 1994	Recommended practice for electrical equipment maintenance

IEC TR 61634 : 1995 High-voltage switchgear and controlgear – Use and handling of sulphur hexafluoride (SF6) in high-voltage switchgear and controlgear

Sections One (scope and general), Section Two (maintenance of electrical switchgear for voltages above 1 kV and up to and including 22 kV) and Section Five (low voltage switchboard) of this standard are based on the applicable clauses of BS 6423 and BS 6626 are reproduced with the permission of British Standards Publishing Ltd.

Additional recommendations relating to the maintenance of specific items of BS 6423 and BS 6626 are given and modifications are made to suit local conditions.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*
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Code of practice for maintenance of electrical equipment of electrical installations

Section One – Scope and general

1.0 Introduction

Electrical equipment deterioration is normal. As soon as new equipment is installed, a process of normal deterioration begins. If left unchecked, the deterioration process can cause malfunction or electrical failure. Deterioration can be accelerated by factors such as hostile environment, overload or severe duty cycle.

Apart from normal deterioration there are other potential causes of equipment failure such as load changes or additions, circuit alterations, improperly set or improperly selected protective devices and changing voltage conditions.

A well-administered maintenance programme will minimise costly breakdowns, unplanned shutdown of production equipment and reduce accidents.

1.1 Scope

1.1.1 Object

This Code covers the maintenance of electrical equipment for voltages up to and including 22 kV to enhance safe and proper operation of electrical installations with reduced risk of breakdown and the consequent interruption of supply. It represents a standard of good practice and therefore takes the form of recommendations for the maintenance of electrical equipment.

It provides information on an organised system of routine maintenance keeping electrical equipment, both indoor and outdoor, and its associated apparatus in good working order. Attention is also drawn to the precautions taken in order to maximise the safety of personnel while maintenance work is in progress.

Special maintenance requirements relating to explosion-proof electrical equipment are excluded from this Code. This Code also does not apply to systems for transmission and distribution of electricity to consumer's electrical installations.

1.1.2 Statutory requirements

The following government regulations have relevance:

1.1.2.1 Workplace Safety and Health Act – Ministry of Manpower

For electrical installations falling within the meaning of the Workplace Safety and Health Act (2006) and amendments made thereafter shall be referred to.

1.1.2.2 The Electricity Act (Cap. 89A), Electricity (Electrical Installations) Regulations 2002 and the Electricity (Electrical Workers) Regulations 2002 – Energy Market Authority

The Acts and regulations shall apply to all electrical installations.

Under Section 82 of the Electricity Act, it is clearly stated that no person shall perform any electrical work or hold himself out as a licensed electrical worker, etc, unless he has a valid electrical worker licence issued under the said Act.

There are three classes of electrical workers licences, namely:

- a) the electrician licence;
- b) the electrical technician licence; and
- c) the electrical engineer licence.

The authority conferred upon and the responsibilities of the three classes of licensed electrical workers are spelt out in the Electricity (Electrical Workers) Regulations 2002.

1.1.3 Responsibility

The Owner/Proprietor shall primarily be responsible to maintain reliable performance of their electrical equipment with advice and assistance from Licensed Electrical Worker. It is the responsibility of Owner/Proprietor to engage a licensed electrical worker of the appropriate class to secure a licence and take charge of his electrical installation. No person other than the licensed electrical worker shall be permitted to operate the electrical installation.

1.2 Normative references

The following referenced documents are indispensable for the application of this Code. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60156	Insulating liquids – Determination of the breakdown voltage at power frequency – Test method
IEC 60422	Supervision and maintenance guide for mineral insulating oils in electrical equipment
IEC 60480	Guide to the checking of sulfur hexafluoride (SF ₆) taken from electrical equipment
IEC TR 61634 : 1995	High-voltage switchgear and controlgear – Use and handling of sulfur hexafluoride (SF ₆) in high-voltage switchgear and controlgear
IEEE Std 400.2 TM -2004	IEEE guide for MV solid dielectric cable
SS 508 :	Graphical symbols – Safety colours and safety signs Part 1 : 2004 – Design principles for safety signs in workplaces and public areas
SS 516 : 2005	Code of practice for application, operation and maintenance of dry-type transformers
SS CP 5 : 1998	Code of practice for electrical installations
SS CP 16 : 1991	Code of practice for earthing