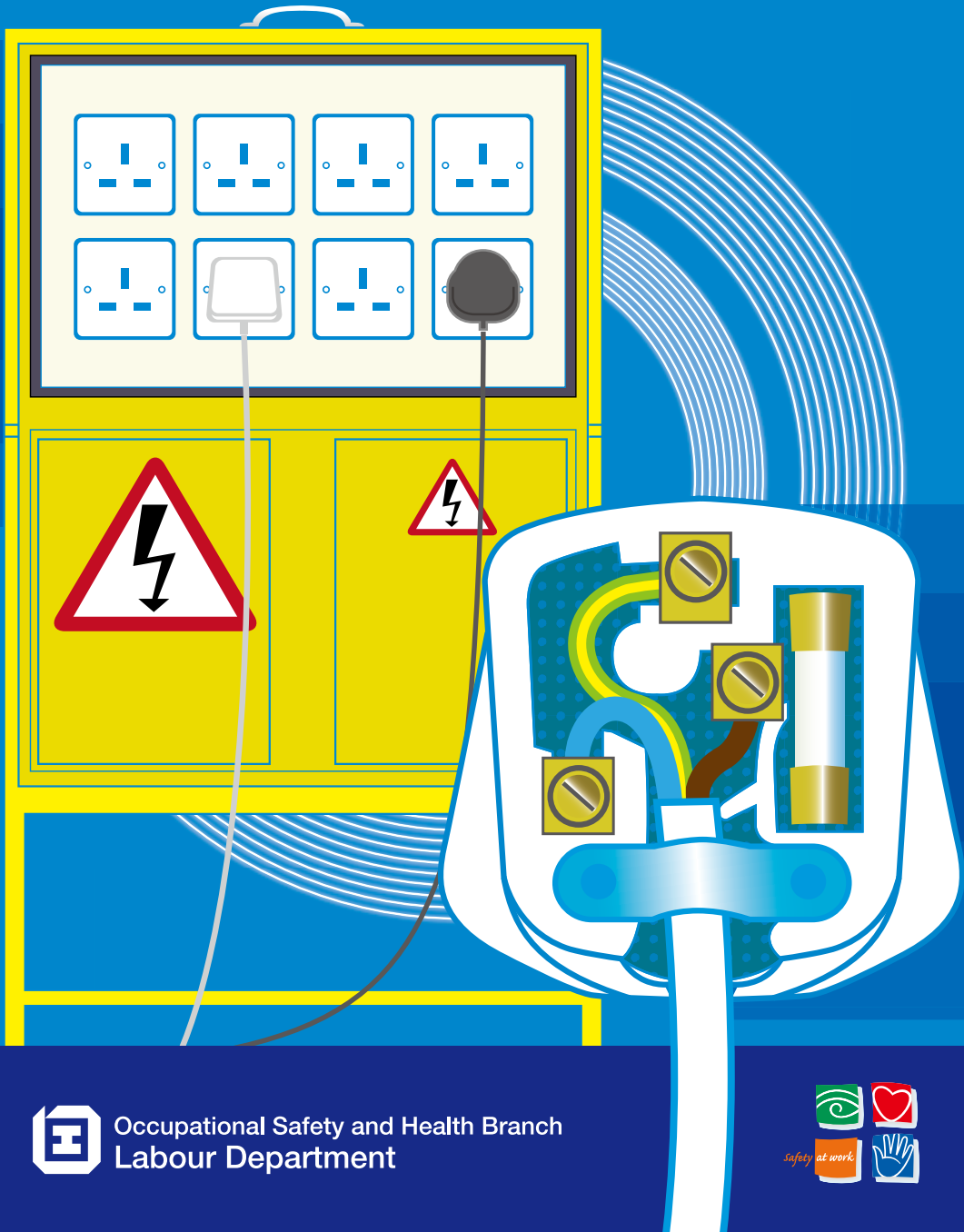


A GUIDE TO THE FACTORIES AND INDUSTRIAL UNDERTAKINGS (ELECTRICITY) REGULATIONS



Occupational Safety and Health Branch
Labour Department



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Labour Department

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A Guide to the
Factories and Industrial Undertakings
(Electricity)
Regulations

CONTENTS

1. INTRODUCTION	1
2. REGULATIONS	2
2.1 Interpretation	2
2.2 Application	4
2.3 Modification of requirements by Commissioner	5
2.4 General safety requirements	6
2.4.1 Construction and usage of apparatus	6
2.4.2 Insulation and protection of conductors	6
2.5 Switches, conductors and electric motors	7
2.5.1 Construction of switches, circuit breakers etc.	7
2.5.2 Protection of circuits by fuses and circuit breakers	7
2.5.3 Construction of joints and connexions	8
2.5.4 Isolation of voltage from parts of a system	8
2.5.5 Use of single-pole switches with one conductor earthed	8
2.5.6 Means of isolating voltage in special circumstances	8
2.5.7 Starting and stopping of electric motors	9
2.5.8 Connexion and earthing of portable apparatus exceeding extra-low voltage	9
2.6 Switchboards and switchboard apparatus	10
2.6.1 Construction of switchboards	10
2.6.2 Enclosure of bare conductors on switchboards	10
2.6.3 Location of switchboard apparatus	11
2.6.4 Precautions to be taken against metal becoming live	11
2.6.5 Precautions to be taken when persons are working on apparatus	11

2.7 Protective equipment, lighting and special risks	12
2.7.1 Provision of protective stands or screens	12
2.7.2 Provision and use of protective stands, screens, boots and gloves	12
2.7.3 Provision of access to and working space for apparatus	12
2.7.4 Lighting of apparatus	13
2.7.5 Precautions for special conditions	13
2.7.6 Precaution for apparatus utilizing high voltage	13
2.7.7 Qualifications and supervision of persons carrying out work	13
2.7.8 Display of notice on treatment for electric shock	14
2.8 Substations	14
2.8.1 Construction of substations	14
2.8.2 Control of and on entry to substations	15
2.8.3 Safe access to underground substations	15
2.9 Duties, offences and penalties	16
2.9.1 Duties of and offences relating to proprietors and electrical contractors	16
2.9.2 Offences relating to misuse of apparatus etc.	16
2.10 Saving	17
3. USEFUL INFORMATION	18
3.1 Enquiries	18
3.2 Complaints	18

1. INTRODUCTION

Electricity is the most common form of energy used both within and outside industries. However, in case of misuse or mishandling, it incurs loss of production time, personal injuries or deaths and damages to properties. The Factories and Industrial Undertakings (Electricity) Regulations lay down basic safety requirements to guard against hazards associated with the distribution and use of electricity in industries.

This guide outlines the provisions of these regulations in simple terms and aims to impress upon both employers and employees the importance of taking adequate safety measures to guard against electrical hazards.

This guide should be read in conjunction with “A Guide to the Factories and Industrial Undertakings Ordinance (Sections 6A & 6B) – Know Your General Duties” which imposes general duties on proprietors and persons employed with regard to the health and safety at work in industrial undertakings.

While every care has been exercised to include important details in this guide, the Factories and Industrial Undertakings (Electricity) Regulations remain the sole authority for the provisions of the law explained.

2.1 Interpretation

Reg. 2

“apparatus” includes all electrical apparatus and any apparatus, machines or fittings in which conductors are used;

“authorized person” means a person who is either –

- (a) the proprietor; or
- (b) an electrical contractor for the time being under contract with the proprietor; or
- (c) a person appointed in writing by a proprietor or an electrical contractor, as the case may be, for all or any of the purposes of regulation 16(2), 26 or 29(2);

“bare” means not covered by insulating material;

“circuit” means an arrangement of conductors forming an electrical system or branch of an electrical system for the purpose of carrying electricity;

“competent person” means a person who is –

- (a) by reason of his qualifications, technical knowledge, training or practical experience able to perform any assigned duty or work in a manner sufficient to avoid electrical hazard; and
- (b) appointed in writing by an authorized person for all or any of the purposes of regulation 16(2), 26 or 29(2);

“conductor” means any wire, cable, bar or tube used for conducting electricity;

“covered” in relation to insulating material, means sufficiently covered with insulating material so as to prevent electrical hazard;

“dead” means at or about zero voltage and disconnected from any live electrical system;

2. REGULATIONS

“earthed” means connected to the general mass of the earth in such manner as will ensure at all times an immediate discharge of electrical energy without causing electrical hazard;

“electrical contractor” means any person or firm engaged in carrying out electrical work by way of trade or business, either on his own account or pursuant to a contract or arrangement entered into with another person, including the State or any public body;

“electrical hazard” means danger to health, life or property from electric fire or electric shock;

“extra-low voltage” means any voltage not exceeding 50 volts alternating current or 120 volts direct current whether between conductors or to earth;

“high voltage” means any voltage normally exceeding low voltage;

“insulated” and “insulating” in relation to any apparatus, device, protective equipment or fitting means made of or covered with a non-conducting material of such design and construction so that it is normally impossible when the apparatus, device, protective equipment or fitting is in use for any person to make accidental or unintentional contact with any live metal or metal liable to become live;

“live” means charged with electricity so that a voltage exists between a conductor and another conductor or a conductor and earth;

“low voltage” means any voltage normally exceeding extra-low voltage but not exceeding 1000 volts alternating current or 1500 volts direct current between conductors or 600 volts alternating current or 900 volts direct current between conductors and earth;

“protective equipment” includes any insulating stands, screens, portable or otherwise, mats and covers and insulating boots, gloves or other protective equipment provided and maintained under regulation 20 or 21(1), as the case may be;

“substation” means any building, structure or enclosure, either above or below ground, containing transforming or converting apparatus in which electrical energy is transformed or converted to or from voltage exceeding low voltage otherwise than for the purpose of working instruments, relays or similar auxiliary apparatus, where such building, structure or enclosure has sufficient space to permit a person to enter;

“switchboard” means a panel or structure on which is located any switching equipment or other apparatus used in or in connexion with the control of current or voltage in an electrical system.

“system” means an electrical system in which all the conductors and apparatus used in or in connexion with the electrical system are connected to a common source of electrical energy; and

“voltage” means the difference of electrical potential between conductors or between a conductor and the earth.

2.2 Application

The Factories and Industrial Undertakings (Electricity) Regulations are applicable to all industrial undertakings in which electricity is generated, transformed, distributed or used. **Reg. 3(1)**

2. REGULATIONS

These regulations shall not apply to an industrial undertaking where the generation, transformation and transmission of electricity or motive power of any kind is carried on – **Reg. 3(2)**

- (a) for the purpose of supplying electricity in accordance with the Electricity Ordinance (Cap. 406);
- (b) for the purpose of moving railway locomotives, trains, rolling stock and vessels which are used for the traffic of the railway under the authority of the Kowloon-Canton Railway Corporation Ordinance (Cap. 372);
- (c) for the purpose of moving cars or trucks upon a tramway under the authority of the Tramway Ordinance (Cap. 107);
- (d) for the purpose of drawing or propelling carriages, cars or trucks upon a tramway under the authority of the Peak Tramway Ordinance (Cap. 265); or
- (e) for the purpose of running locomotives, trains, carriages, trucks or any other conveyance upon a railway under the authority of the Mass Transit Railway Ordinance (Cap. 556).

Where the operating voltage of electrical apparatus in an industrial undertaking does not exceed extra-low voltage, the following regulations are not applicable:– **Reg. 3(3)**
 regulations 6, 7, 10, 11, 12, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28 and 29.

2.3 Modification of requirements by Commissioner

Where the Commissioner is satisfied that strict compliance of these regulations under any particular circumstances is not necessary for the prevention of electrical hazard, he may modify any such requirements, by certificate in writing, if he is satisfied that reasonable freedom from electrical hazard can be secured or that no increase in electrical hazard will result. **Reg. 4(1)**

In granting such modification the Commissioner shall specify any special work or requirement he considers necessary to ensure reasonable freedom from electrical hazard. **Reg. 4(2)**

The Commissioner may, by certificate in writing, rescind any modification if he is satisfied that the electrical hazard has thereby been unduly increased. **Reg. 4(3)**

2.4 General safety requirements

2.4.1 Construction and usage of apparatus

All apparatus and conductors used in connexion with an electrical installation shall be of sufficient size and capacity for the work they are called upon to do and for the purposes for which the supply of electrical energy is to be used; they shall be of the correct type of construction, properly installed, protected and maintained to prevent electrical hazard. **Reg. 5(1)**

Accidental personal contact with live parts of apparatus shall be prevented either by design and construction of the apparatus, or by the manner that they are installed. **Reg. 5(2)**

2.4.2 Insulation and protection of conductors

All live conductors, including those forming part of apparatus, shall be so insulated and further effectively protected where necessary, or so placed and safeguarded, so as to prevent electrical hazard so far as is reasonably practicable. **Reg. 6**

2. REGULATIONS

2.5 Switches, conductors and electric motors

2.5.1 Construction of switches, circuit breakers etc.

Every switch, switch fuse, circuit breaker and isolating link shall be :- **Reg. 7**

- (a) constructed, placed and protected so as to prevent electrical hazard;
- (b) constructed and adjusted accurately so as to make and maintain effectual contact;
- (c) provided with a handle or other suitable means of working, insulated from the system and arranged so that the person operating it is unlikely to make accidental contact with live metal;
- (d) constructed and installed in such manner so that when in an "off" position it cannot accidentally make contact with live metal;
- (e) constructed and installed in such manner so that it cannot with proper care be left in partial contact with live metal; and
- (f) constructed and installed in such manner as may be necessary to prevent electrical hazard from arcing and so that an arc cannot accidentally be maintained.

2.5.2 Protection of circuits by fuses and circuit breakers

Every circuit shall be protected against excess current and energy by a fuse or circuit breaker of suitable rating; the fuse or circuit breaker shall be suitably located in the circuit, and its construction shall be able to prevent electrical hazard from overheating, arcing, or scattering of hot metal or other substance when it is operated. **Reg. 8(1)**

Every fuse and circuit breaker in any circuit shall be capable of breaking the maximum prospective excess current or energy at the point of installation. Every switch intended to be used for breaking under load shall be capable of breaking the load at the point of installation without causing electrical hazard. **Reg. 8(2)**

Every fuse shall be constructed and installed or protected by a suitable switch so as to permit ready renewal of the fuse element without electrical hazard. **Reg. 8(3)**

2.5.3 Construction of joints and connexions

Every electrical joint and connexion shall be of proper construction and design as regards conductivity, insulation, mechanical strength and protection. **Reg. 9**

2.5.4 Isolation of voltage from parts of a system

Such efficient means, suitably located, shall be provided for cutting off and isolating all voltage from every part of a system as may be necessary to prevent electrical hazard. **Reg. 10**

2.5.5 Use of single-pole switches with one conductor earthed

In a system where one of the conductors is connected to earth, no single-pole switch shall be placed in that conductor or any branch thereof, other than a link for testing purposes or a switch for use in controlling a generator. **Reg. 11**

2.5.6 Means of isolating voltage in special circumstances

A switch or other suitable device shall be provided and installed in a suitable location for the purpose of cutting off and isolating all voltage from every motor, converter and transformer and other associated apparatus in an electrical system. **Reg. 12(1)**

It shall not be necessary to comply with regulation 12(1) in the case of a conductor in a system if that conductor is earthed. **Reg. 12(2)**

2. REGULATIONS

2.5.7 Starting and stopping of electric motors

An effective starting and stopping switch shall be provided for every electric motor. Such switch or switches shall be conveniently located so as to be readily accessible and easily operated by the operator. **Reg. 13(1)**

Where a machine is used and driven by an electric motor, such efficient means, suitably located, shall be provided for either stopping the machine or switching off the electric motor as may be necessary to prevent electrical hazard or other danger. **Reg. 13(2)**

Every electric motor shall be fitted with a suitable device so that when stoppage occurs through power failure or voltage fluctuation, the motor will not restart automatically to cause electrical hazard or other danger. **Reg. 13(3)**

2.5.8 Connexion and earthing of portable apparatus exceeding extra-low voltage

Portable apparatus operating at a voltage exceeding extra-low voltage shall – **Reg. 14**

- (a) have all its flexible wires connected to the system either by effective permanent joints or by properly constructed connectors;
- (b) be protected against leakage to earth of current liable to cause electrical hazard;
- (c) be controlled by efficient means suitably located so as to permit ready operation for cutting off all voltage.

2.6 Switchboards and switchboard apparatus

2.6.1 Construction of switchboards

The construction and installation of a switchboard shall comply with the following— **Reg. 15**

- (a) adequate access can be obtained to any component part which may have to be adjusted or handled;
- (b) the location, course and continuity of every conductor may where necessary be readily identified and traced;
- (c) every conductor arranged for connexion to a separate system is located and kept apart and may where necessary be readily distinguished; and
- (d) every bare conductor is protected against accidental short circuit liable to cause electrical hazard.

2.6.2 Enclosure of bare conductors on switchboards

Where there is a live or normally exposed bare conductor in a switchboard, the switchboard shall either be enclosed or fenced off so as to prevent people from coming into contact with the live metal. **Reg. 16(1)**

Where a live or normally exposed bare conductor in a switchboard is required for any particular purpose, and that it is so situated that only an authorized person or a competent person acting under the immediate supervision of an authorized person may have access, enclosing or fencing as required under regulation 16(1) will not be necessary. **Reg. 16(2)**

Only an authorized person or a competent person acting under the immediate supervision of an authorized person shall enter an area enclosed or fenced off as required under regulation 16(1). **Reg. 16(3)**

2. REGULATIONS

A warning notice in red characters and letters each not less than 50mm high on a white background bearing the following words shall be placed under regulation 16(1) : –

“危險—帶電電綫。未經授權，不得內進。”

DANGER LIVE WIRES — UNAUTHORIZED ENTRY PROHIBITED”

Reg. 16(4)

2.6.3 Location of switchboard apparatus

All apparatus and equipment used in or in connection with a switchboard and requiring handling, their location and installation shall comply with the following : –

Reg. 17

- (a) such apparatus and equipment can be readily operated from floor level or from a working platform provided for that purpose;
- (b) all measuring instruments and indicators used in or in connexion therewith can be readily observed from floor level or from the working platform;
- (c) any such apparatus, equipment, measuring instrument or indicator that cannot be readily operated or observed from floor level or from a working platform, can be otherwise operated or observed without electrical hazard.

2.6.4 Precautions to be taken against metal becoming live

Any metalwork used for enclosing or supporting conductors shall be earthed or protected by other suitable means such as proper insulation to prevent such metal from being electrically live.

Reg. 18

2.6.5 Precautions to be taken when persons are working on apparatus

When people are required to work on any conductor, apparatus or switchboard, adequate precautions shall be taken which include to prevent such conductor, apparatus or switchboard from becoming accidentally live, so as to ensure that the work may be carried out safely.

Reg. 19(1)

A warning notice in red characters and letters each not less than 50mm high on a white background bearing the following words shall be placed and displayed in a visible position at, on or near any conductor, apparatus or switchboard being worked on under regulation 19(1) : –

“危險—在修理中 DANGER UNDER REPAIR”

Reg. 19(2)

2.7 Protective equipment, lighting and special risks

2.7.1 Provision of protective stands or screens

Where necessary as a protection against electrical hazard, adequate insulating stands and screens or other protective equipment shall be provided and maintained in good condition and kept permanently in position.

Reg. 20

2.7.2 Provision and use of protective stands, screens, boots and gloves

As a protection against electrical hazard, portable insulating stands, screens, mats and covers and insulating boots, gloves or other protective equipment shall be provided and maintained in good condition for use where necessary.

Reg. 21(1)

Every person working on apparatus shall make proper use of any protective equipment provided under regulation 21(1).

Reg. 21(2)

2.7.3 Provision of access to and working space for apparatus

When people are normally required to operate or attend apparatus, the apparatus shall be so installed that there are adequate access and working space for its operation and attention without electrical hazard.

Reg. 22

2. REGULATIONS

2.7.4 Lighting of apparatus

Where necessary as a precaution against electrical hazard, adequate lighting shall be provided in all parts of the premises where apparatus which, in normal use, requires operation or attention by any person is installed. **Reg. 23**

2.7.5 Precautions for special conditions

All apparatus and conductors :- **Reg. 24**

- (a) exposed to weather, water, corrosive atmospheres or other adverse conditions;
- (b) exposed to flammable surroundings or explosive atmosphere; or
- (c) used in any process or for any special purpose other than for lighting and power;

shall be suitably constructed, installed and protected to prevent electrical hazard or other danger.

2.7.6 Precaution for apparatus utilizing high voltage

Where necessary as a precaution against electrical hazard all apparatus operating at high voltage, shall have placed and displayed in a visible position at, on or near such apparatus a notice in red characters and letters each not less than 50 mm high on a white background reading **Reg. 25**

“危險—高壓電力 DANGER HIGH VOLTAGE”

2.7.7 Qualifications and supervision of persons carrying out work

Where technical or practical knowledge or experience is required in order to avoid electrical hazard, only an authorized person shall carry out or assist in carrying out work on any apparatus. **Reg. 26(1)**

A competent person acting under the immediate supervision of an authorized person may also carry out or assist in working on an apparatus, if – **Reg. 26(2)**

- (a) where the electrical hazard to be avoided is under the control of an electrical contractor, the competent person is appointed by the electrical contractor; and
- (b) where the electrical hazard to be avoided is under the control of the proprietor, the competent person is appointed by the proprietor.

2.7.8 Display of notice on treatment for electric shock

A notice in both Chinese and English issued or approved by the Commissioner giving instructions as to the treatment of persons receiving an electric shock shall be displayed in all parts of the premises where electricity is generated, transformed, or used, and at such other places in their premises as the Commissioner may direct. **Reg. 27**

2.8 Substations

2.8.1 Construction of substations

Every substation shall be properly designed and constructed, and all apparatus installed in it shall be properly located, protected or screened to prevent unauthorized persons from gaining access, and secured against interference from the outside. **Reg. 28(1)**

Every substation shall be kept in a dry condition and provided with efficient means of ventilation to prevent electrical hazard. **Reg. 28(2)**

2. REGULATIONS

2.8.2 Control of and on entry to substations

Every substation shall be put under the charge and control of an authorized person. Entry to any part of the substation where electrical hazard is liable to arise shall be restricted only to the authorized person or a competent person acting under his immediate supervision. **Reg. 29(1)**

Only an authorized person or a competent person acting under the immediate supervision of an authorized person shall enter any part of a substation as mentioned in regulation 29(1). **Reg. 29(2)**

A warning notice in red characters and letters each not less than 50mm high on a white background bearing the following words shall be placed and displayed in a visible position at the entrance to every part of a substation as mentioned in regulation 29(1) : – **Reg. 29(3)**

“危險—變壓站；未經授權，不得內進
DANGER SUBSTATION – UNAUTHORIZED ENTRY
PROHIBITED”

2.8.3 Safe access to underground substations

Subject to Regulation 30(2), underground substations which are not easily and readily accessible shall be provided with adequate means of access through a door or trap door with a staircase or ladder securely fixed in a safe position so that people cannot accidentally come into contact with any live part of any switchboard or any bare conductor therein. **Reg. 30(1)**

A doorway and a staircase shall be provided for every underground substation where : – **Reg. 30(2)**

- (a) people are employed in the substation other than for cleaning or inspection; or
- (b) because of the smallness in size of the substation and that there are electric motor driven machinery or apparatus utilizing high voltage.

2. REGULATIONS

2.9 Duties, offences and penalties

2.9.1 Duties of and offences relating to proprietors and electrical contractors

The proprietor of every industrial undertaking shall ensure that the provisions of regulations 5, 6, 7, 8, 9, 10, 11, 12(1), 13, 14, 15, 16(1), 17, 18, 19, 20, 21(1), 22, 23, 24, 25, 26, 27, 28, 29(1) and 30(1) are complied with. **Reg. 31(1)**

The proprietor of the industrial undertaking is liable to a fine of \$50,000 upon conviction by a court of law of an offence mentioned in regulation 31(1). **Reg. 31(2)**

Any proprietor or electrical contractor who orders, directs, authorizes, permits or suffers any person to contravene regulation 16(3) or 29(2) is liable to a fine of \$50,000 upon conviction by a court of law. **Reg. 31(3)**

The proprietor of an industrial undertakings who without reasonable excuse contravenes regulation 26 is liable to a fine of \$50,000 and to imprisonment for 6 months. **Reg. 31(4)**

2.9.2 Offences relating to misuse of apparatus etc.

Any person is liable to a fine of \$50,000 upon conviction by a court of law for : – **Reg. 32**

- (a) wilfully misusing or interfering with any apparatus or protective equipment which could cause an electrical hazard to himself or to other persons;
- (b) wilfully and without reasonable cause doing any other thing liable to cause electrical hazard to himself or other persons; or
- (c) contravening regulation 16(3), 21(2), 26 or 29(2).

2. REGULATIONS

2.10 Saving

The provisions in the Factories and Industrial Undertakings (Electricity) Regulations shall be in addition to and not in derogation of the provisions of : – **Reg. 33**

- (a) regulation 6(1)(a), (b), (c) and (d) of the Factories and Industrial Undertakings (Cargo and Container Handling) Regulations (Cap. 59 sub. leg. K);
- (b) regulation 47(1) of the Construction Sites (Safety) Regulations (Cap. 59 sub. leg. I);
- (c) the Electricity Ordinance (Cap. 406).

3. USEFUL INFORMATION

3.1 Enquiries

If you wish to enquire about this guide or require advice on occupational safety and health, you can contact the Occupational Safety and Health Branch of the Labour Department through :

Telephone : 2559 2297 (auto-recording after office hours)

Fax : 29151410

E-mail : enquiry@labour.gov.hk

Information on the services offered by the Labour Department and on major labour legislation can also be found by visiting our Homepage at <http://www.labour.gov.hk>.

3.2 Complaints

If you have any complaints about unsafe workplaces and practices, please call the Labour Department's occupational safety and health complaint hotline at 2542 2172. All complaints will be treated in the strictest confidence.

