

# Safe Electrical Installation for Healthcare Facilities

19 January 2019



機電工程署  
**EMSD**



## Healthcare Engineering Systems



喉管式醫療氣體供應系統  
(Medical Gas Pipeline System)

醫療儀器  
(Biomedical Equipment)



照明系統  
(Lighting System)



電力系統  
(Electrical System)



冷氣系統  
(Air-Conditioning System)

# Safe Electrical Installation for Healthcare Facilities

## I. Design and Installation

- Electricity Ordinance (Cap.406)
- Buildings Energy Efficiency Ordinance (Cap.610)
- Health Technical Memorandum (HTM) 06-01 on Electrical Services Supply and Distribution
- Electrical Demand Loading & Protective Device Consideration

## II. Operation and Maintenance

- Periodic Inspection, Testing and Certificate (WR2)
- Other Testing (e.g. On load test of emergency generator & function test on batteries)

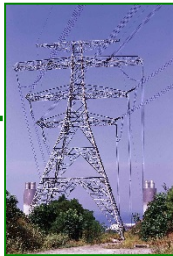
# I. Design and Installation

## *(ii) Cap. 406 – Electricity Ordinance*

### Power Supply

### Distribution

### Electrical Products



406A – Electricity Supply  
Regulations

406H – Electricity Supply Lines  
(Protection) Regulations

406E – Electricity (Wiring)  
Regulations

406D – Electricity  
(Registration)  
Regulations

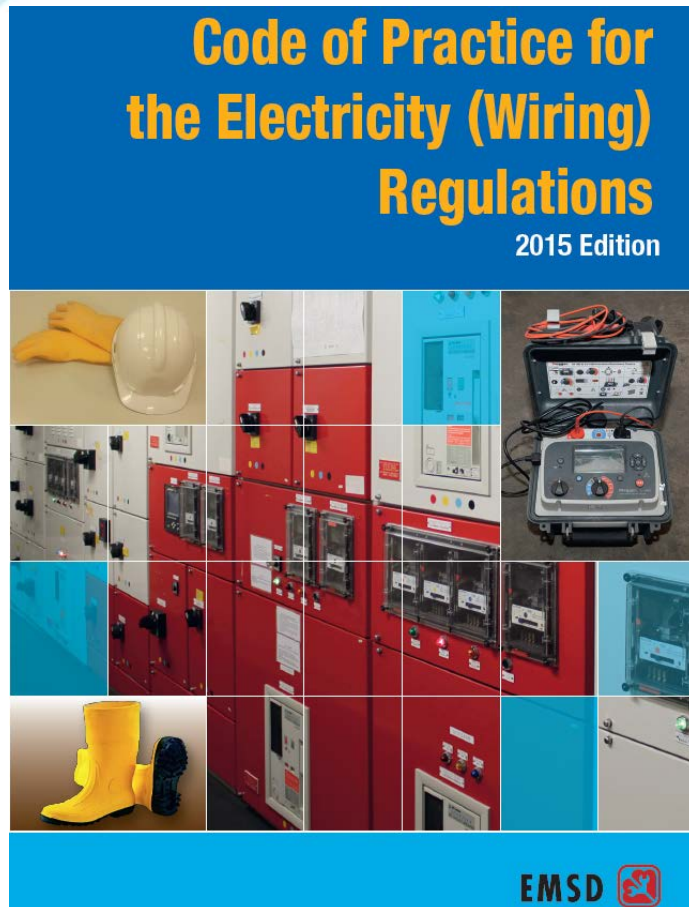
406G – Electrical  
Products  
(Safety)  
Regulation



# I. Design and Installation

## *(ii) Cap. 406 – Electricity Ordinance*

### Code of Practice for the Electricity (Wiring) Regulations



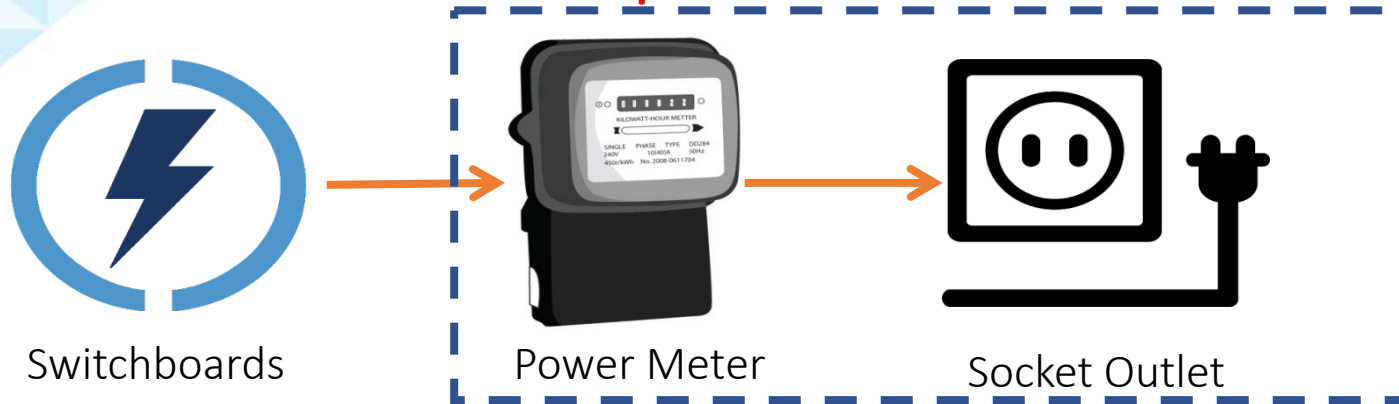
General technical guidelines on the statutory requirements in accordance with:

- international electrical safety standards and
- latest technical development

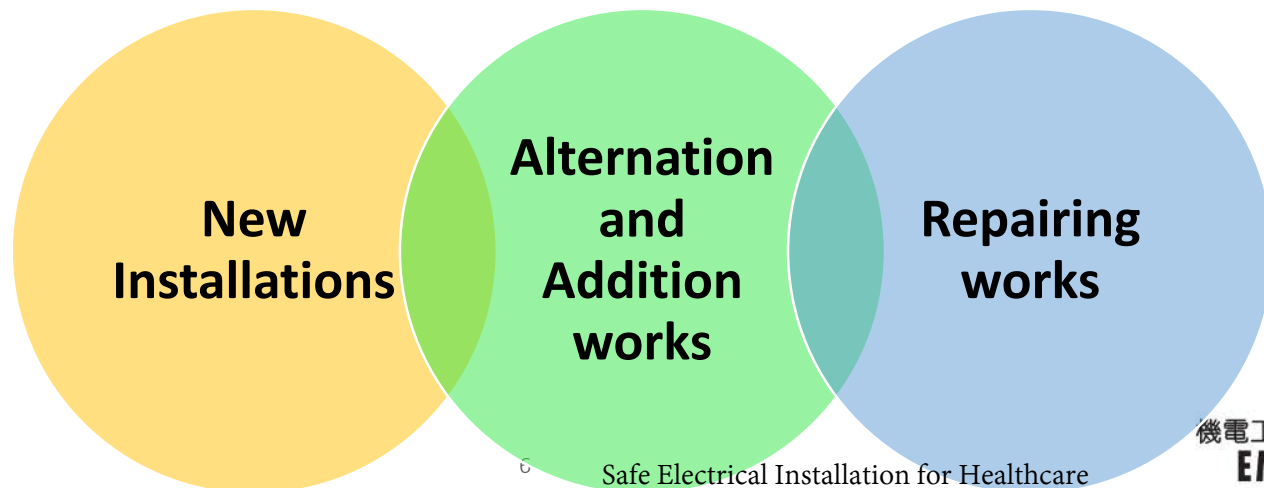
# I. Design and Installation

## *(ii) Cap. 406 – Electricity Ordinance*

What is **WR1 – Work Completion Certificate**?



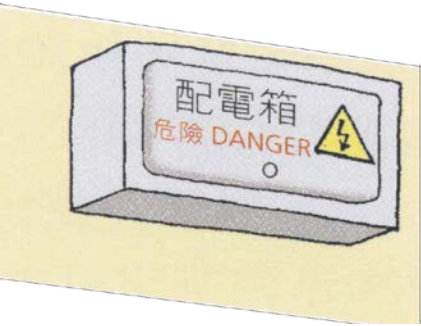
For Fixed Electrical Installations...



# I. Design and Installation

## *(ii) Cap. 406 – Electricity Ordinance*

### *Fixed Electrical Installations*

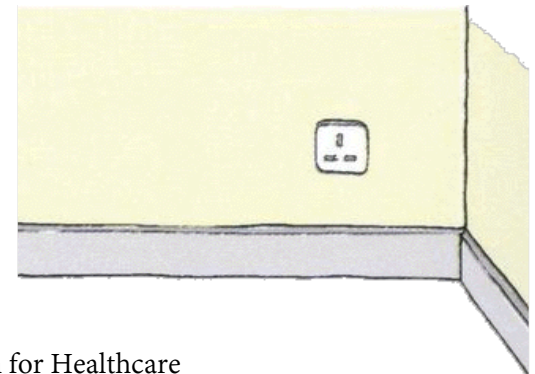
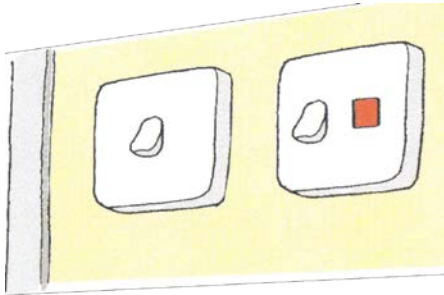
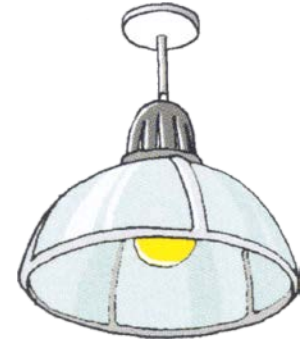


**Switchboard and  
Distribution Boards**

**Circuitry and  
Socket outlets**

**Switches and Lighting**

**Equipment directly  
connected to electrical  
distribution system**



# I. Design and Installation

## *(ii) Cap. 406 – Electricity Ordinance*

What is the responsibility of owner in relation to installation?



- Employ Registered Electrical Contractor (REC)



- Employ Registered Electrical Worker (REW)

- Grade A: Low voltage,  $\leq 400A$ , single / three phase
- Grade B: Low voltage,  $\leq 2,500A$ , single / three phase
- Grade C: Low voltage, any capacity
- Grade H: High voltage
- Grade R: Special trade, e.g. neon sign installation

電業工程人員註冊證明書  
Certificate of Registration of Electrical Worker  
電力條例 (第406章) ELECTRICITY ORDINANCE (CAP. 406)

註冊編號 Registration Number: W 0 0 0 0 0 1

姓名: 陳安全  
Name: CHAN ON CHUEN

工程級別 Grade: A

准許工程 Permitted Work: AO

有效日期由 Valid from: 02/06/2009 至 until: 01/06/2012

發給機構 Issued by: 機電工程署 EMSD





# I. Design and Installation

Safe Electrical Installation for Healthcare  
Facilities

## (ii) Cap. 610 – Buildings Energy Efficiency Ordinance (BEEO)

機電工程署  
EMSD

ENG 繁體 简体

《建築物能源效益條例》  
The Buildings Energy Efficiency Ordinance

空調裝置  
Air-conditioning installation

電力裝置  
Electrical installation

升降機及自動梯裝置  
Lift & escalator installation

照明裝置  
Lighting installation

Energy Audit Form  
能源審核表格

Code of Practice for  
Energy Efficiency of  
Building Services  
Installation

2015 EMSD

# I. Design and Installation

## *(ii) Cap. 610 – Buildings Energy Efficiency Ordinance (BEEO)*

### Scope of Buildings Energy Efficiency Ordinance (BEEO)

#### Prescribed Buildings





- | Prescribed Buildings             |                                                                         |
|----------------------------------|-------------------------------------------------------------------------|
| • Hotel & guesthouses            | • Commercial buildings                                                  |
| • Educational buildings          | • Industrial buildings –<br><b>common area</b>                          |
| • Community buildings            |                                                                         |
| • Municipal services             | • Residential buildings –<br><b>common area</b>                         |
| • <b>Hospitals &amp; clinics</b> |                                                                         |
| • Government buildings           | • Composite buildings –<br>– commercial portion                         |
| • Airport passenger buildings    | – <b>common area</b> of portion<br>for residential or industrial<br>use |
| • Railway stations               |                                                                         |



# I. Design and Installation

## *(ii) Cap. 610 – Buildings Energy Efficiency Ordinance (BEEO)*

### Exemption on premises (s4 of BEEO)

1. Small buildings ( $\leq 3$ -storey,  $\leq 65.03 \text{ m}^2$ ) 
2. Buildings with approved electrical loading ( $\leq 100\text{A}$ , 1-ph/3-ph) 
3. Historical or Monument buildings 
4. Buildings to be demolished in 12 months 
5. BS installations, with specific operational & technical natures such as
  - fire services;
  - installations solely used for surgical operation, clinical treatment, blood processing, providing / maintaining appropriate environment settings for life protection, or any combination of the purposes specified above;
  - ...

# I. Design and Installation

## *(ii) Cap. 610 – Buildings Energy Efficiency Ordinance (BEEO)*

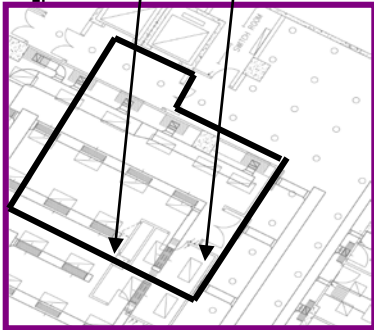
### *What is Major Retrofitting Works (MRW)?*

#### Works Area

Addition/replacement of a BS installation specified in the BEC at the following conditions –

total floor area covered by the works (i.e. works area)  $\geq 500 \text{ m}^2$  in a unit or a common area

If the works are conducted as a same series of works in phases or at different places in a unit or a common area, total floor area covered by these works (i.e. works area)  $\geq 500 \text{ m}^2$  within 12 months aggregating



#### Central BS installation

Addition/replacement of a **main component** of a central BS installation, incl. –



a complete electrical circuit at rating  $\geq 400\text{A}$ ;  
or



a unitary air-conditioner or a chiller at rating  $\geq 350\text{kW}$  (cooling or heating);  
or



motor drive + mechanical drive of a lift, escalator or passenger conveyor

OR



# I. Design and Installation

## *(ii) Cap. 610 – Buildings Energy Efficiency Ordinance (BEEO)*

### *What is Major Retrofitting Works (MRW)?*

BEC Table 10.1 (a)



<div> <div>①</div> <div>②</div> <div>③</div> <div>④</div> </div>			
<b>Table 10.1</b> <b>Major Retrofitting Works and Energy Efficiency Requirements</b>			
Category of Major Retrofitting Work	Condition for Applicability of BEC Requirement	Applicable BEC Requirement	BEC Clause No.
(a) Works involving addition or replacement of a building services installation that covers one or more places with a floor area or <u>total floor area of not less than 500 m<sup>2</sup></u> under the same series of works within 12 months in a unit or a common area should include item (i), item (ii) and/or item (iii) as described below (please also see the remarks at the end of this table) –			
(i) addition or replacement of luminaire(s)	total circuit wattage of the additional or replacement luminaires at or exceeding 3kW	no existing luminaires in the area, or the sum of circuit wattage of additional or replacement luminaires is more than that of 50% of the original luminaires in the area	lighting power density
			5.4





# I. Design and Installation



## *(ii) Cap. 610 – Buildings Energy Efficiency Ordinance (BEEO)*

*What is Major Retrofitting Works (MRW)?*



### **Addition / Replacement of luminaire(s) $\geq 3\text{kW}$**

- Common T5 fluorescent lamp (1200mm)

 =  $\sim 28\text{W}$    
 $3\text{kW} \sim 107\text{pcs}$

### **Addition / Replacement of air handling unit(s), unitary air-conditioner(s) and / or chiller(s) $\geq 60\text{kW}$**

- Common AC in household (1 horsepower)

 =  $745\text{W}$

$60\text{kW} \sim 80\text{ sets}$



# I. Design and Installation

## *(ii) Cap. 610 – Buildings Energy Efficiency Ordinance (BEEO)*

*What is the responsibility of owner in relation to installation?*



### - Employ Registered Energy Assessors (REA)

#### Qualifications

- Registered professional engineer in discipline of electrical, mechanical, environmental or building services engineering
- >2 years post-qualification practical experience

OR

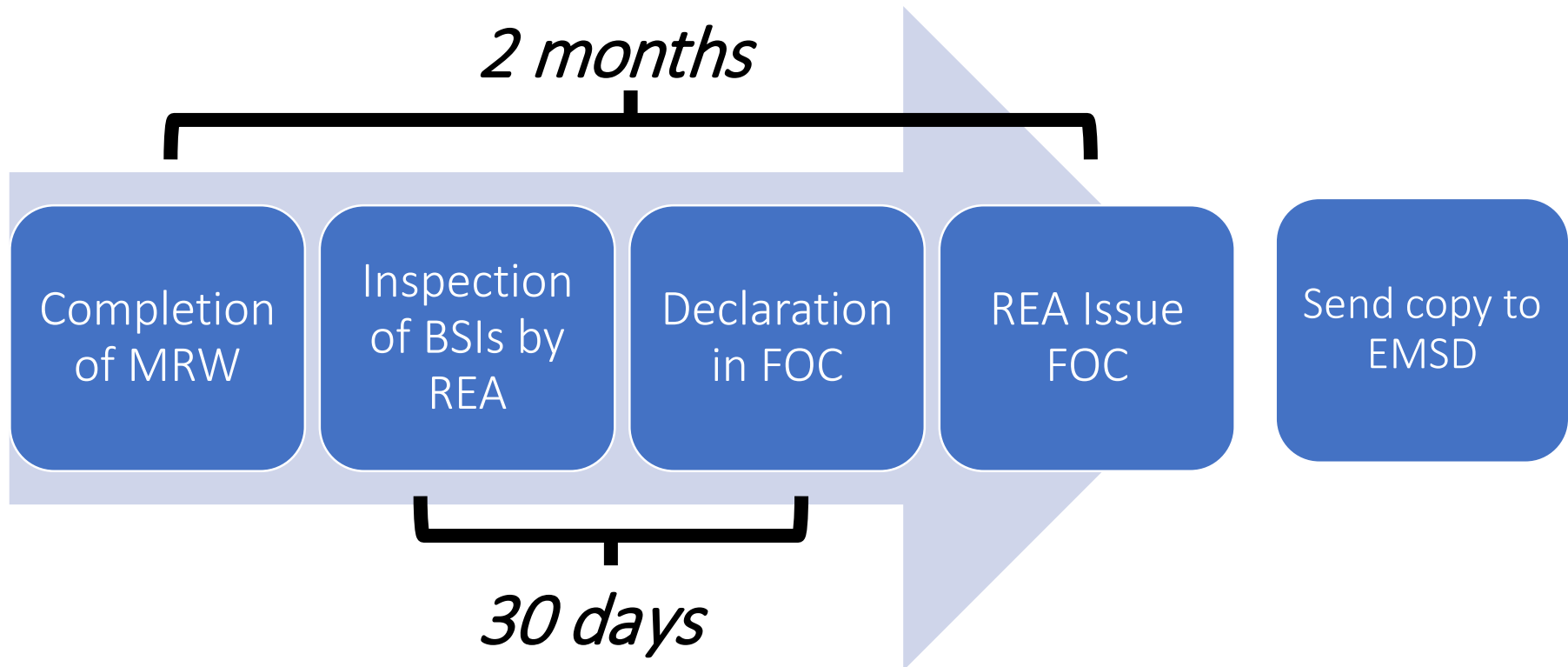
- Corporate member of the Hong Kong Institution of Engineers or equivalent in discipline of electrical, mechanical, environmental or building services engineering
- >3 years post-qualification practical experience



# I. Design and Installation

## *(ii) Cap. 610 – Buildings Energy Efficiency Ordinance (BEEO)*

*What is the Form of Compliance (FOC) and when should it be submitted?*



# I. Design and Installation

## *(iii) Health Technical Memorandum 06-01 on Electrical Services Supply and Distribution*

### *Risk to Patient due to Loss of Supply*

Clinical Risk Grade	Description
A – Life support / Complex Surgery	Disconnection of the supply represents a threat to life
B – Complex treatment and diagnostics	Clinical treatment and patient safety may be compromised (but not endangered) by any minor interruption of electrical supply
C - General Patient Care	Clinical treatment and patient safety will not be immediately compromised by an interruption of electrical power
D – Ambulant Care	Disruption, inconvenience and a reduced environmental quality but would not directly compromise clinical treatment and safe
E – Support services and circulation	No immediate effect on the clinical treatment of safety of patients

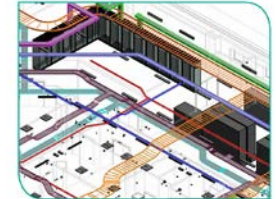
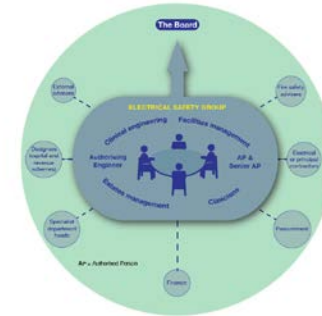
# I. Design and Installation

## *(iii) Health Technical Memorandum 06-01 on Electrical Services Supply and Distribution*

What are the  
considerations for back-  
up power supply?

Health  
Department  
of Health

Health Technical Memorandum  
06-01  
Electrical services supply and  
distribution  
2017 edition



Sustainability



Risk  
Mitigation

RISK

Resilience

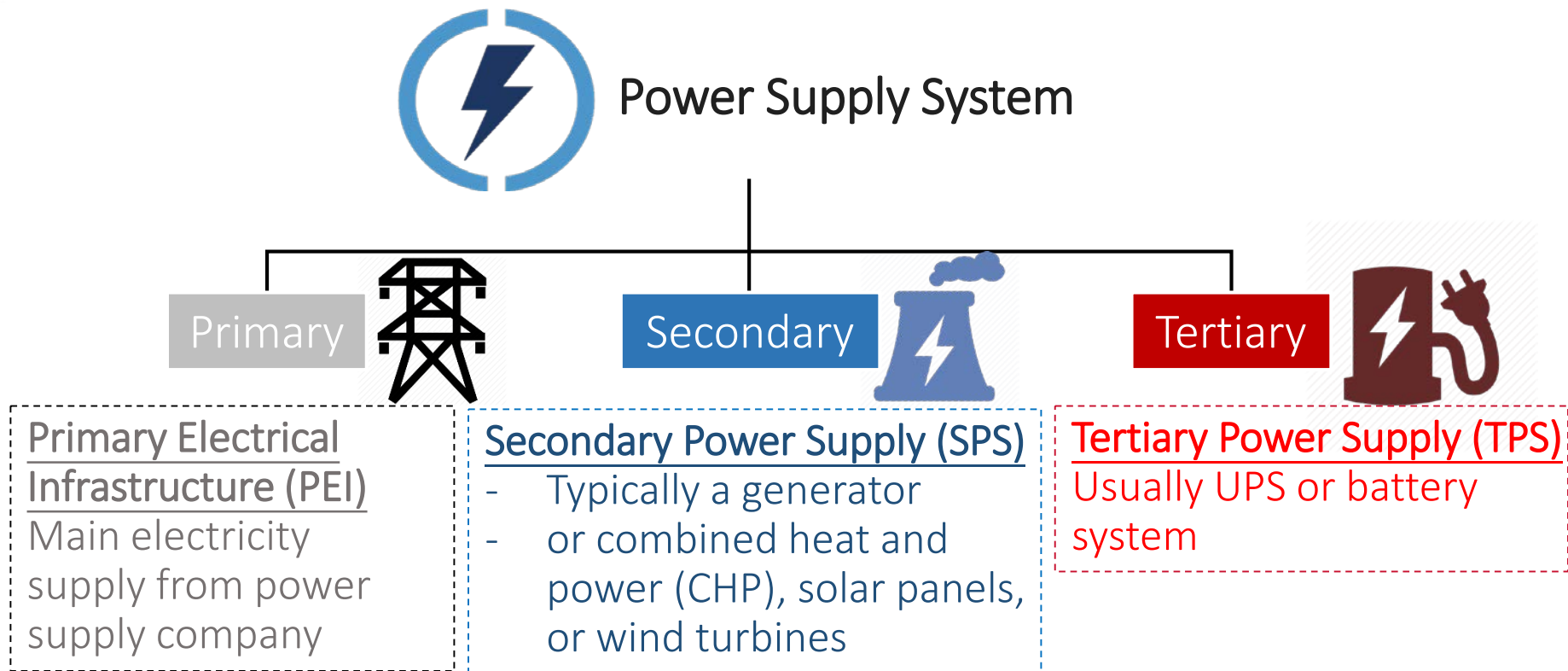




# I. Design and Installation

## *(iii) Health Technical Memorandum 06-01 on Electrical Services Supply and Distribution*

*What are the definitions in HTM06-01?*

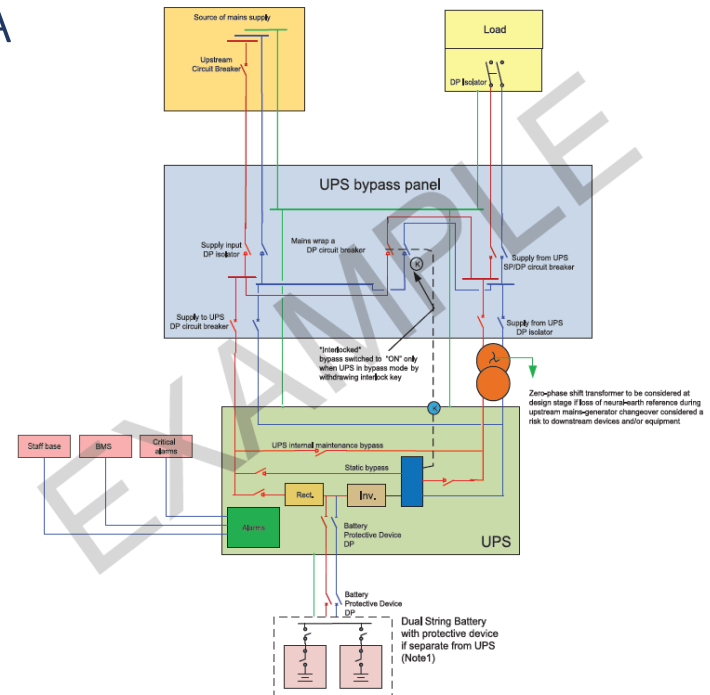


# I. Design and Installation

## *(iii) Health Technical Memorandum 06-01 on Electrical Services Supply and Distribution*

### *Tertiary Power Supply: UPS Installation*

- TPS supply for areas of clinical risk grade A or B (e.g. OT & ICU)
- Battery autonomy should be 1-3 hours following failure of the electrical supply.
- The battery autonomy in line with the procedures should be coordinated with Clinicians, equipment's suppliers and designers.



# I. Design and Installation

- (iv) *Electrical Demand Loading*
- (v) *Protective Device Consideration*

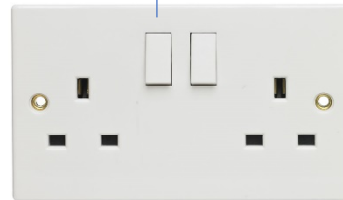
MCCB



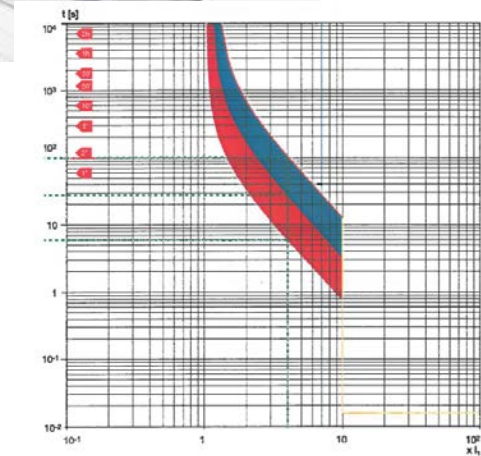
MCB



MCB



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Faulty equipment



## II. Operation and Maintenance

*What is the responsibility of owner in relation to installation?*

- Inspected, tested and certified periodically in accordance with Electricity (Wiring) Regulations (Cap. 406E)
  - **Periodic Inspection, Testing and Certification (PITC)**



Electrical Installation	Approved loading	Frequency
Low voltage fixed electrical installation	> 100A	5 Years
High voltage fixed electrical installation	Any	1 year
Hospital or maternity home	Any	5 Years

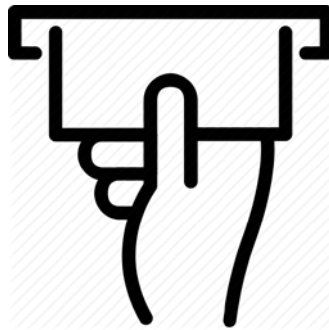
## II. Operation and Maintenance

### *(i) Periodic Inspection, Testing and Certification (PITC)*

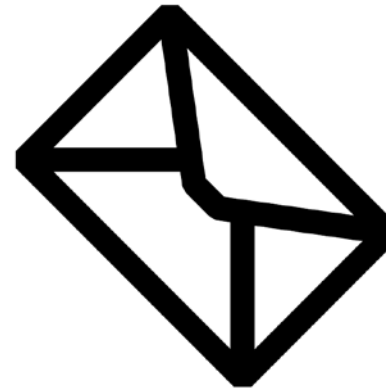
What is WR2 – Certification of PITC?



Report  
submission by  
REW with  
endorsement  
by REC / owner:  
within 1 month



Submission of  
WR2 form by  
owner or his/her  
representative:  
within 2 weeks  
after the date of  
certification



Endorsement by  
DEMS, the Form  
WR2 will be  
returned



Record keeping  
by REC:  
not less than 5  
years



## II. Operation and Maintenance

### *(ii) Other Testing - HTM 06-01*

*(e.g. Online test of emergency generator and functional test on batteries.)*



Seconda

- Generator plant (HTM 06-01, Clause 17.83)
  - Method: To be tested online with building load, including testing of interlock / changeover arrangements
  - Frequency: Every month
  - Testing duration: At least 1 hour, preferably 2 hours



Terti

- UPS (HTM 06-01, Clause 17.104)
  - Method: To be tested on-load
  - Frequency: At least once every 6 months
  - Testing duration: Monitored over a 10-minute period

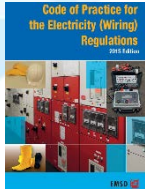
# Summary

Overview of the  
statutory  
requirements on  
“Electrical  
Installation” regime

Highlight the  
internationally  
acceptable  
healthcare  
standard (HTM 06-  
01 “Electrical Services  
Supply and  
Distribution”

Design &  
Installation  
Considerations of  
Healthcare  
Facilities from  
“Electrical” point  
of view

Operation &  
Maintenance  
Considerations of  
Healthcare  
Facilities from  
“Electrical” point  
of view



# Thank You!

## Electricity Ordinance (Cap 406)

Email: [info@emsd.gov.hk](mailto:info@emsd.gov.hk)

Tel: 1823

## Buildings Energy Efficiency Ordinance (Cap 610)

Email: [mbec@emsd.gov.hk](mailto:mbec@emsd.gov.hk)

Tel: 3757 6156

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