





**ندوة خبراء  
السلامة الكهربائية**  
Electrical Safety Experts Symposium

## Electrical Safety in Buildings; Malaysia Regulatory Perspective


**Mr. Abdul Rahim Bin Ibrahim**  
Director, Electrical Safety Energy Commission, Malaysia

---

الرئيسي  
Main Sponsor



الرئيسي  
Platinum Sponsor



الرعاة الذهبين  
Golden Sponsor




الرعاة المشاركين  
Co. Sponsors




---


منظم الحدث  
Event Manager




الجهات المنظمة الرئيسية  
Key Organizers



الجهات الداعمة  
Supporting Organizations




## COUNTRY PROFILE



**ندوة خبراء  
السلامة الكهربائية**  
Electrical Safety Experts Symposium

Area	- 329,733 sq.km (Peninsular, Sabah & Sarawak)	
Climate	- Tropical Type	
	- Average temperature between 20° C to 32° C	
	- Average rainfall of about 3540 mm per annum	
Population	- 28.9 million with a multi racial community comprising Malays, Chinese, Indians, Kadazans, Bajaus, Muruts, Kelabits, Dayaks, Ibans and others	
Labour force	-12.0 million	
No. of Consumer	- 7.23 million	
	Domestic	84.13%
	Commercial	15.47%
	Industry	0.4 %
Total Electricity Generation	-113,823 GWh	
Total Electricity Consumption	- 99,548 GWh	
Per Capita Electricity	- 3,594 kWh	



## THE ENERGY COMMISSION (EC)



### Roles

The Energy Commission is the regulator for the electricity and gas supply industry. Its key role is to regulate the energy industry based on the provision provided under Energy Commission Act (2001) and other related Acts of Malaysia.

The Commission aims to balance the needs of consumers and providers of energy to ensure safe and reliable supply at reasonable prices, protect public interest, and foster economic development and competitive markets in an environmentally sound manner.

3

## Legal Framework



- Energy Commission Act 2001
- Electricity Supply Act 1990
- Gas Supply Act 1993
- Electricity Regulation 1994
- Licensee Supply Regulations 1990
- Efficient Management of Electrical Energy Regulations 2008
- Licences' terms and conditions
- Grid Code and Distribution Code.

## FUNCTIONS ON SAFETY



Electrical safety regulation, focusing on:

- Safe working and operation of electrical installations;
- Safe use of electricity & electrical equipment;
- Safety of personnel;
- Competency of electrical engineers, supervisors and workers;
- Safety standards of electrical installations & equipment.

5

## ELECTRICAL INSTALLATION IN DOMESTICS AND BUILDINGS



All electrical installations have to comply with:

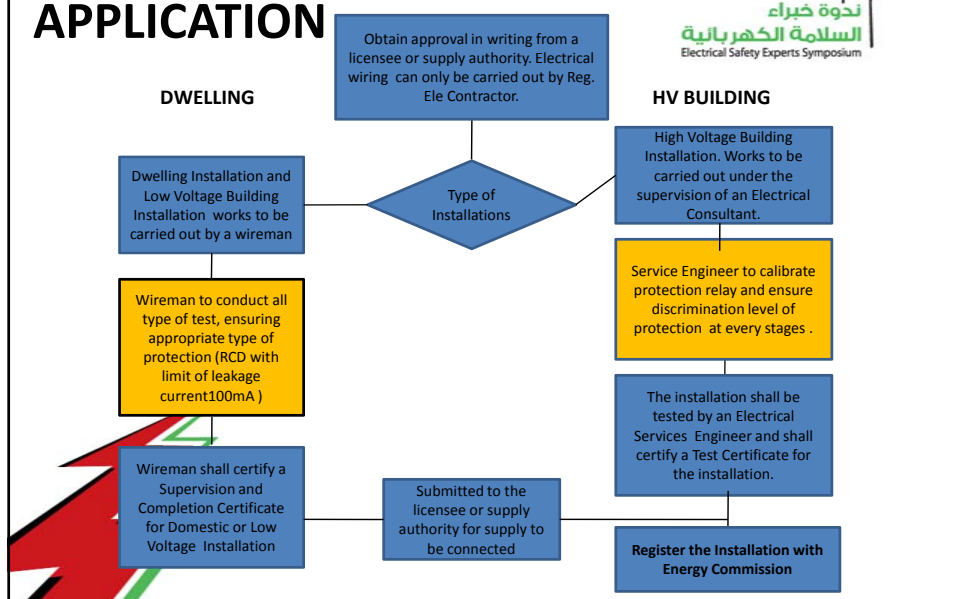
1. **Electricity Regulation 1994 (Law of Malaysia)**
2. MS/IEC 60364 - "WIRING INSTALLATION IN BUILDINGS"

## Legal Obligation For Electrical Installation in Buildings



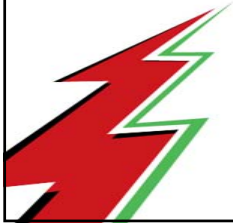
- Reg. 75 - Electrical installation work can only be carried out by a Registered Electrical Contractor
- Reg. 12 – Wiring works shall be under the immediate supervision of a wireman. Upon completion the wireman shall certify a **Supervision and Completion Certificate**. No installation shall receive electricity until the Supervision and Completion Certificate and Test Certificate has been submitted by the owner or management of the installation to the licensee or supply authority.
- Reg. 13 – For installations operating at higher than low voltage, the installations shall be tested by an Electrical Services Engineer.

## THE PROCESS FLOW OF SUPPLY APPLICATION





## PROTECTION SYSTEM IN A DOMESTIC INSTALLATION



### Protection Against Earth Leakage Current



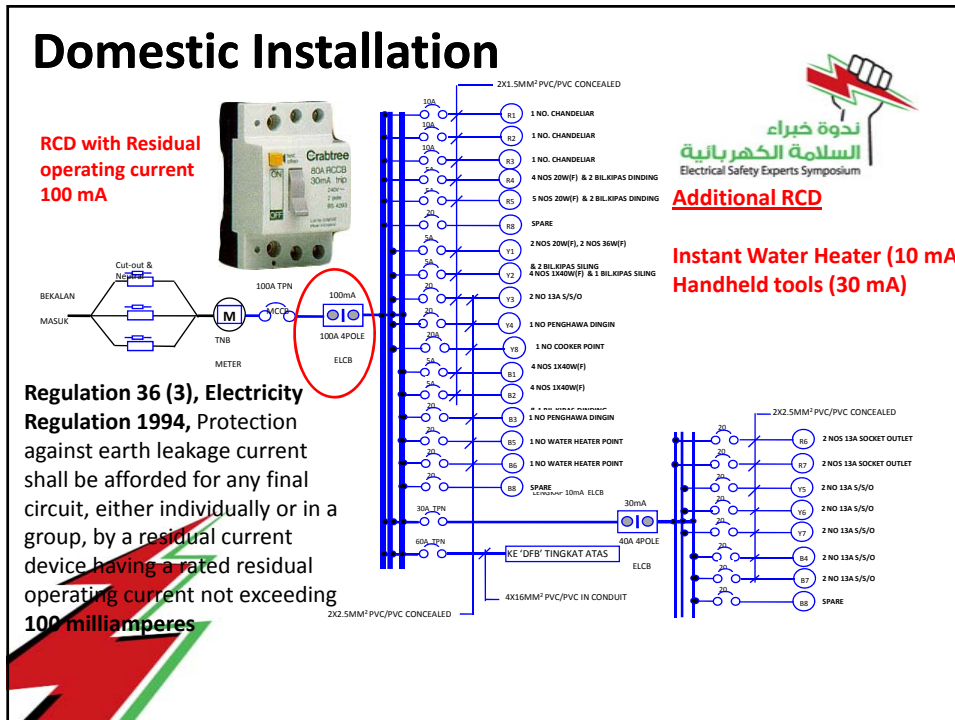
- **Regulation 36 (4), Electricity Regulation 1994**, Protection against earth leakage current shall be afforded for any final circuit, either individually or in a group, by a residual current device having a rated residual operating current not exceeding 100 milliamperes
- **Regulation 36 (3)** For an installation where hand-held equipment, apparatus or appliance is used or is likely to be used ..... not exceeding 30 milliamperes. (eg. Electric hand tools )
- **Regulation 36 (2)** For an installation in a place where the floor is likely to be wet or where the wall or enclosure is of low electrical resistance ... .....not exceeding 10 milliamperes. (eg. installing water heater in a bathroom )



### Effects of Electric Current in the Human Body

Current	Reaction
1 mA	Perception level. Just a faint tingle.
5 mA	Slight shock felt; not painful but disturbing. Average individual can let go. However, strong involuntary reactions to shocks in this range can lead to injuries.
6-25mA (women)	Painful shock, muscular control is lost.
9-30 mA (men)	This is called the freezing current or "let-go" range.
50-150 mA	<b>Extreme pain, respiratory arrest, severe muscular contractions.* Individual cannot let go. Death is possible.</b>
1.0 – 4.3 A	Ventricular fibrillation. (The rhythmic pumping action of the heart ceases.) Muscular contraction and nerve damage occur. Death is most likely.
<b>10.0 A</b>	<b>Cardiac arrest, severe burns and probable death.</b>

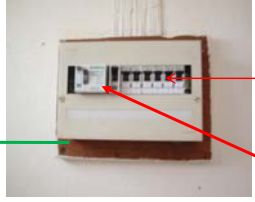
<http://www.hobbyprojects.com/electrical-hazards/effects-of-electric-current-in-human-body.html>




## PROTECTION AGAINST EARTH LEAKAGE CURRENT AND OVERCURRENT




ندوة خبراء  
السلامة الكهربائية  
Electrical Safety Experts Symposium



**MINIATURE CIRCUIT BREAKER**



MCB  
B32  
Circuit




**Earthing System**

**Earth Leakage Circuit Breaker, ELCB  
With sensitivity of mA and below.**




Crabtree  
80A RCCB  
30mA Trip  
240V  
2 pole  
BS 4593

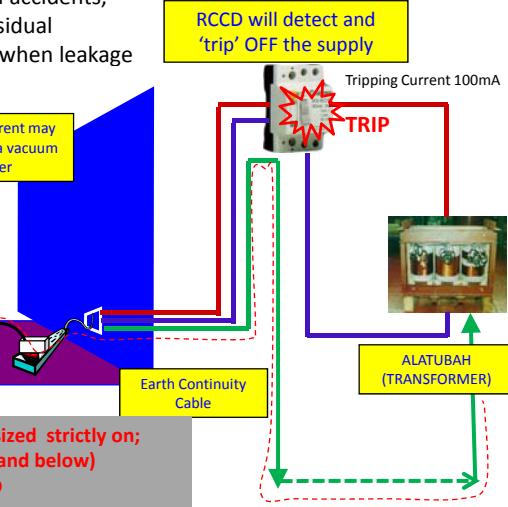


ندوة خبراء  
السلامة الكهربائية  
Electrical Safety Experts Symposium

Base on analyses of domestic electrical accidents, most fatal cases could be avoided if residual operating current device trip instantly when leakage current occurred.



Leakage current may occurred in a vacuum cleaner



RCCB will detect and 'trip' OFF the supply

Tripping Current 100mA

TRIP

ALATUBAH (TRANSFORMER)

Earth Continuity Cable

To ensure safety to dweller, the law emphasized strictly on;

1. The usage of appropriate RCCD (100mA and below)
2. Regularly test on the functioning of RCCD
3. The use of only approved electrical appliances.

Sometime RCCD fail to detect leakage current due to mechanism failure, no maintenance or no observation for a long period of time.

ندوة خبراء السلامة الكهربائية  
Electrical Safety Experts Symposium

ALATUBAH (TRANSFORMER)

Earth Continuity Cable

Electrical appliances may cause current to leak due to aging or unforeseen damage.

A complete circuit will developed

In many domestics electrical accident cases, it is found that RCCD has failed to detect leakage current. As a result the leakage current flow through human body and form a complete circuit to cause electrocution.

ندوة خبراء السلامة الكهربائية  
Electrical Safety Experts Symposium

A typical effects of electrocution is a burn mark can be seen at the point of entry (hand) and at the point of exit (foot)





## BUILDING INSTALLATION



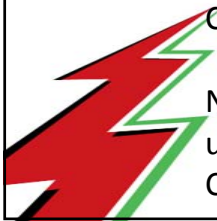
### High Voltage and Large Power Installation



Before the completion of a new installation, the owner thereof shall forward an application for registration.

The Commission shall cause inspection and tests to be made. If the installation satisfies the requirements the Commission shall issue a Certificate of Registration.

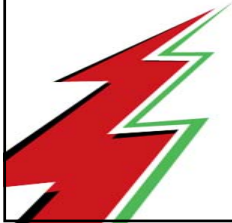
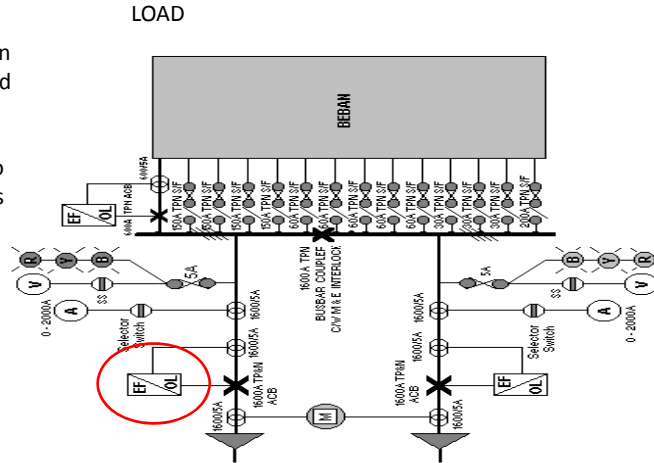
No person shall possess or operate an installation, unless the installation is registered on a valid Certificate of Registration.



# High Voltage and Large Power Installation



Reg. 110(4) Any **protective relay and device** of an installation shall be checked, tested and calibrated by a competent person at least once in every two years, or at any time as directed by the Commission.



**protective relays and devices** of an installation shall be checked, tested and calibrated by a competent person at least once in every two years, or at any time as directed by the Commission.

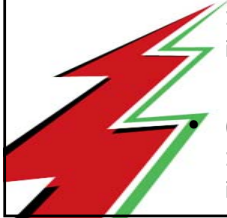


## Installation to be visited and inspected by competent person.

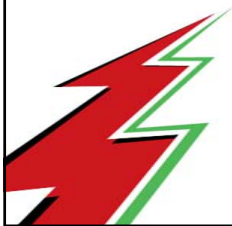
### Competent person and frequency of visit and inspection.



- Regulation 67(2) The number of visits for the purpose of inspection by the competent person shall be as follows:
  - (a) for an installation not exceeding 600 volts and receiving electricity via a switchgear rated at or above **100 amperes**, the minimum number of visits for the purposes of inspection per month shall be **one** visit;
  - (b) for an installation exceeding 600 volts but not exceeding **11,000 volts**, the minimum number of visits for the purpose of inspection per month shall be **two** visits; and
  - (c) for an installation exceeding 11,000 volts but not exceeding **132,000 volts** the minimum number of visits for the purpose of inspection per month shall be **four** visits:



## STATISTIC OF ELECTRICAL ACCIDENT CASES



## LOCATION OF ELECTRICAL ACCIDENTS (2002 – 2009)



Location	Number of Cases	Percentage (%)
Utility Installation (TNB & SESB)	251	57.6
Commercial	39	9
Industrial	44	10
Government-owned premises	33	7.7
Domestic	68	15.7
	436	100%

## Competent Person

(Certificates issued from 1994 up to December 2009)



CATEGORY	TOTAL
Electrical Services Engineer	202
Competent Electrical Engineer	1,031
Electrical Supervisor	183
Chargeman	32,002
Wireman	45,099
Cable Jointer	213
<b>GRAND TOTAL</b>	<b>78,730</b>

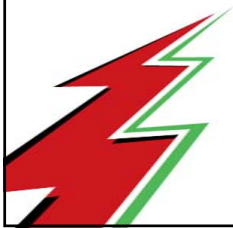
## CAUSES OF ELECTRICAL ACCIDENT (2002 – 2009)



	Cause of Accident	Percentage (%)	Total cases
1	Failure to maintain installation accordingly	38.1	166
2	Non compliance to safe working procedures	31.4	137
3	Trespassing of utility substation	9.9	43
4	Activity nearby transmission/distribution line	10.1	44
5	Unsafe wiring installation	2.3	10
6	Defects on electrical equipment/tools	1.6	7
7	Others causes	6.6	29
		100	436



## PUBLIC AWARENESS PROGRAMME





**ندوة خبراء السلامة الكهربائية**  
Electrical Safety Experts Symposium

**Keselamatan Elektrik Di Musim Banjir**  
Bijak Mengurus, Nyawa Selamat

Technical publications have been developed and made available in the following formats:- Brochure, Pamphlet, Article, Poster



**ندوة خبراء السلامة الكهربائية**  
Electrical Safety Experts Symposium

# THANK YOU

**ABDUL RAHIM IBRAHIM**  
Director, Electrical Safety Energy Commission, Malaysia  
aribrahim@st.gov.my

**الرئيسي Main Sponsor**  
الفنار alfanar

**الرئيسي الملائمي Platinum Sponsor**  
K3 MENA ETRA

**الرعاة الذهبيون Golden Sponsor**  
ABB AIToukhi الطوضي

**الرعاة للشركاء Co-Sponsors**  
Jerdalah COMPANY legrand SOCOTEC

**منظم الحدث Event Manager**  
AMAD

**الجهات المنظمة الرئيسية Key Organizers**  
fisuel المملكة العربية السعودية وزارة المياه والكهرباء

**الجهات الداعمة Supporting Organizations**  
SABO SNEC