# NATIONAL FORUM ON MALAYSIAN STANDARDS ON LIGHT EMITTING DIODES (LEDs)

# TEST FACILITIES FOR LIGHTING PRODUCTS

**BY :**
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**SIRIM Berhad, SHAH ALAM**
**21 MAY 2012**

Managed by :

# TEST FACILITIES FOR LIGHTING PRODUCTS


**Presented By:**

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**Electrical & Electronics Section**
**Testing Services Department**

**21 May 2012**

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a) Introduction

b) Test Facilities
- Safety Test
- Performance & Energy Efficiency Test

c) What's new?
- Energy Efficiency Laboratory
- EEST Customer Service Group

# INTRODUCTION

# *Technical Regulations & Approval of Electrical Equipment in Malaysia*

- **Electricity Supply Act 1990 (Act 447) or the Electricity Regulation 1994**

- **ST REGULATED ELECTRICAL EQUIPMENT - 31 Items, including Lighting products / accessories incorporating LED lamps:**
  **ST COA & SIRIM safety label are mandatory**

  **With COA….we can ensure that the product meets**
  **a) specified safety requirement AND**
  **b) efficient use of electricity where relevant**

  **And that can only be achieved through relevant tests**

# Electrical & Electronic Section (EEST)

**Building 16**

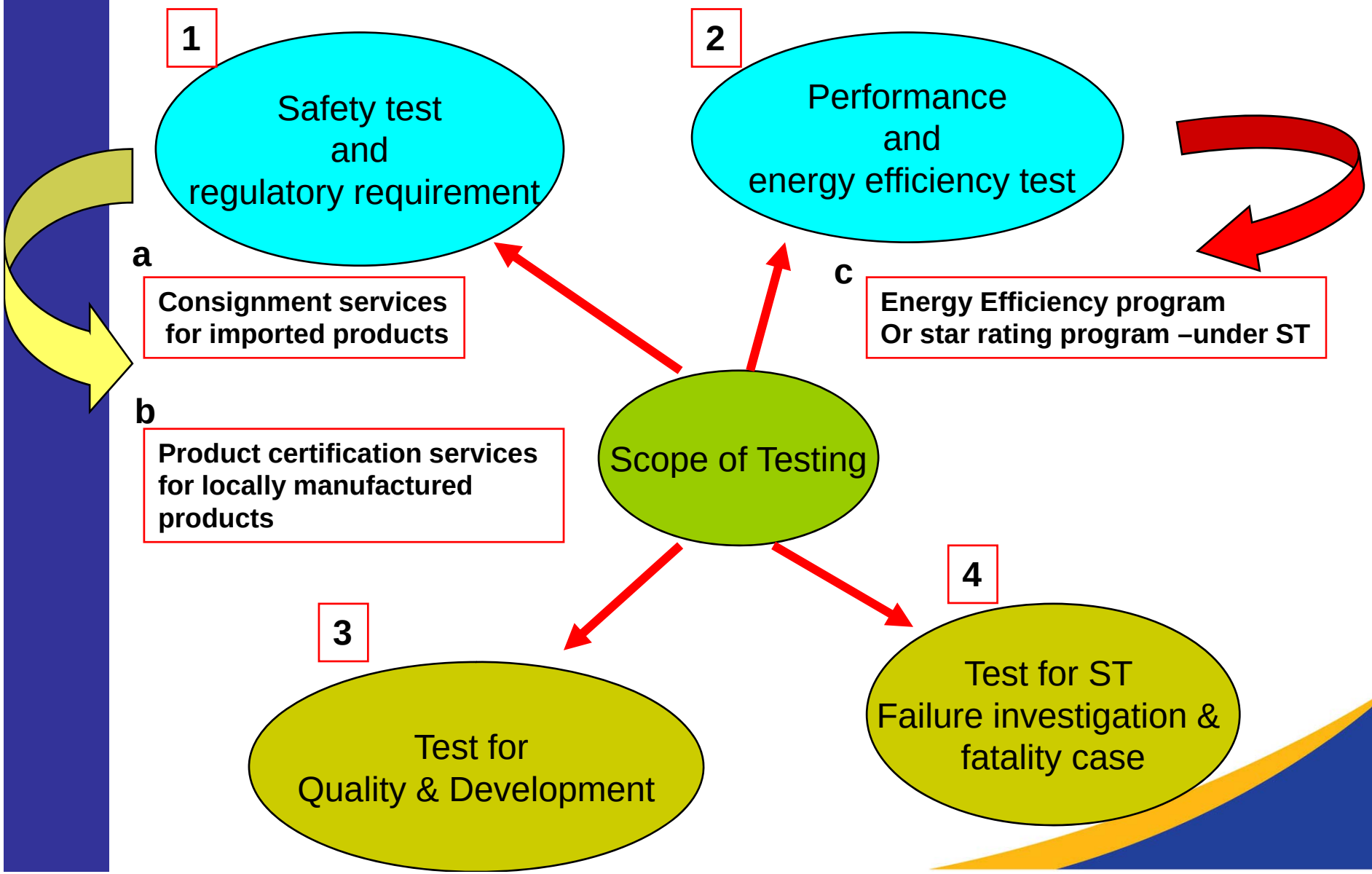
**Building 9**

**Also in Seksyen 16**

- Providing testing facilities and services to verify the safety and performance of electrical and electronics products.

- Acting as an independent third party testing laboratory that provide compliance testing for various EEE in Malaysia.

# Testing Services - Scope



# Our Credentials

# Accreditation

**SIRIM QAS International (Electrical & Electronic Section (EEST))**

**1. ACCREDITED UNDER SAMM SCHEME BY STANDARDS MALAYSIA SINCE NOV 1995**

**SAMM NO. 086**

**2. ACCREDITED AS AN NCB & A CBTL UNDER THE IECEE CB SCHEME SINCE DEC 2002**

**(World most famous and successful Conformity Assessment Scheme for mutual recognition of test certificates and test reports for electrical equipment**

**3. DESIGNATED/LISTED AS ONE OF TESTING LAB UNDER the ASEAN EEMRA for ASEAN Countries SINCE APRIL 2005**

# The Evolution of Electric Lighting

Learn more at www.EdisonTechCenter.org/Lighting.html

Developmental

Commercialized

Xenon Short-arc Lamp

Metal Halide Short-arc

Metal Halide (High Pressure)

Metal Halide Lamp (Low Pressure)

Mercury Vapor Lamp (low pressure)

Higher Pressure Mercury Vapor Lamps

Carbon Arc Lamp

Moore Tube

Fluorescent Lamp (Cold Cathode)

Neon Lamp

Fluorescent (Hot Cathode)

Sodium Vapor Lamp (LPS)

High Pressure Sodium Lamp

Induction Lamp

Incandescent Lamp

Nernst Lamp

Tungsten Halogen Lamp

Electroluminescent Lamp

EL Displays - TFEL, TDEL

LED

OLED

*100 Years Condensed*

*Online learning program available about these lamps along with videos and teacher's resources. Visit the url above for more information*

Year

1800 1900 1950 2000

# Types of Electrical Light Source

**A-Incandescent**

Incandescent bulb

**Halogen lamp**

**B- Gaseous Discharge**

**Fluorescent**

**CFL**

**Metal halide**

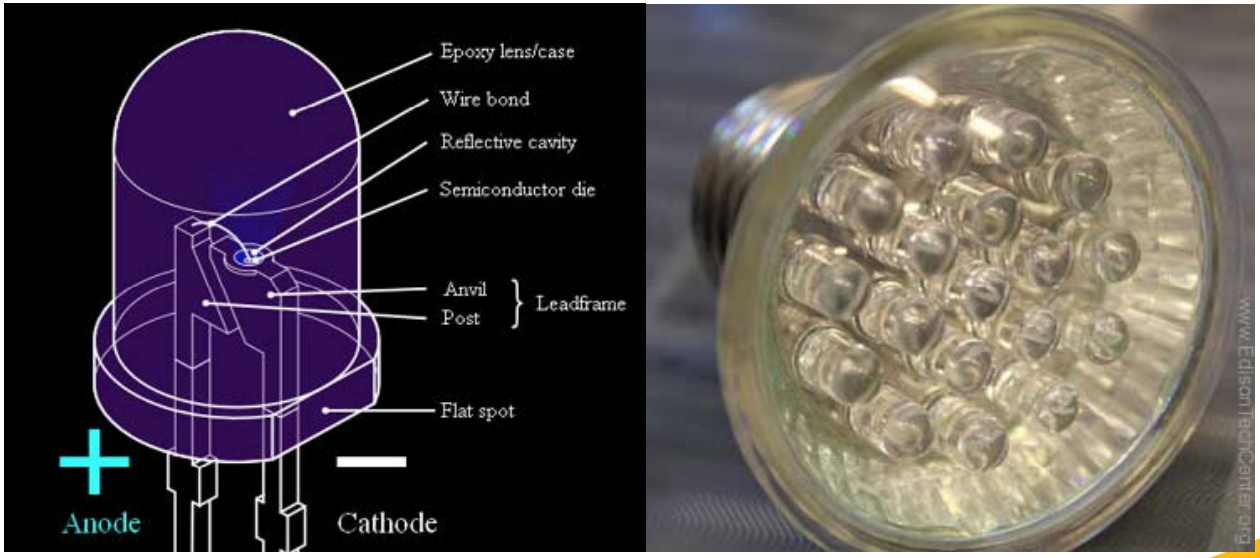
**Sodium**

**C- LED**

**D-Magnetic Induction Lamp**

# Emergence of LED Lighting

**Emergence of LED Technology**



# Lighting Products & Components

## Examples of Lighting Products

1- **Luminaires -General Purpose Luminaire, Recessed Luminaires & Street Lantern**

2- **Emergency and safety sign - Emergency Lighting, KELUAR Sign**
3- **Christmas Lights, Lighting Chains**
4- Other lamp Products – **Table Lamp, Self Ballasted Lamp, Traffic Light, Floodlight , etc.**

## Examples of Lighting Component

1-Fluorescent Tubes, Tungsten Filament Lamps, CFL, **LED modules, LED Lamps**
2-Electronic Ballast, Conventional / Wire wound Ballast, **LED Driver**
3- **Adaptor for Lamp Holders**
4- **Lamp Holders, Connector**
5-Starter & Starter Holder
6-Capacitor
7-Ignitors

# Our
# Test Facilities for
# Lighting Products

# SQASI TEST FACILITIES FOR LIGHTING PRODUCTS

The lighting test facilities not meant solely for LED lamp testing.

The facilities are for all type of lamps regardless of their light sources.

The same facilities CAN be used for some of required tests for LED lamp.

Test facilities for :

-- SAFETY TEST

-- PERFORMANCE & Energy Efficiency TEST

# Safety Test

The importance of testing on Electrical Safety standards is obvious:

"users of electric and electronic devices have to be protected from harm while operating

Most of safety standard for electrical products are developed with the assumption that, the user is considered to be not aware of the various risks associated with the use of electricity.

# Safety Test

The safety of (electrical ) appliance / equipment and application of a safety standard are intended to reduce the risk of injury or damage due to the following;

a) Electric shock
b) Energy related hazards
c) Fire
d) Heat related hazards
e) Mechanical hazards
f) Radiation
g) Chemical hazards

# Some Safety Critical Tests

To name a few….

a. Protection against electric shock
b. Clearance & Creepage Distance Measurement
c. Temperature rise test
d. Leakage Current Measurement
e. High Voltage test
f. Insulation resistance test
g. Construction checking
h. Earth continuity test
i Resistant to heat, fire & tracking (Material test)
j. Mechanical strength test
k. Component evaluation

# Relevant Safety Standard for LED product testing

| NO. | TITLE OF LED STANDARDS ON LIGHTING | LED Lighting & Accessories | TESTING STATUS |
|---|---|---|---|
| 1 | MS IEC 60598-1:2012 (P) Luminaires Pt 1: General requirements and tests &<br><br>MS IEC 60598-2-# (1,2,3,4,…22) |  | Testing Facilities available at SIRIM QAS (EEST)<br>MST (vibration test, dust test) |
| 2 | MS IEC 60838-2-2:2008 Miscellaneous lampholders –Part 2-2:Particular requirements<br>– Connectors for LED-modules |  | Testing Facilities available at SIRIM QAS<br>Facilities at EEST and<br>MST (vibration test) |
| 3 | MS IEC 61347-1:2012 (P) Lamp control gear<br>Pt 1: General and safety Requirements |  | Testing available<br>Facilities at EEST |
| 4 | MS IEC 61347-2-13:2012 (P) Lamp controlgear<br>– Part 2-13: Particular requirements for d.c. or a.c. supplied electronic control gear for LED modules | | Testing available<br>Facilities at EEST |

# Relevant Safety Standard for LED product testing

| NO. | TITLE OF LED STANDARDS ON LIGHTING | LED Lighting & Accessories | TESTING STATUS |
|---|---|---|---|
| 5 | MS IEC 62031:2011<br>LED modules for general lighting<br>- Safety specifications |  | Test equipment for Photobiological hazard testing Waiting for delivery expected Jul 2012 |
| 6 | MS IEC 62560:2012 (P)<br>Self-ballasted LED-lamps for general lighting services by voltage > 50 V - Safety specifications |  | Full facilities expected from Jul 2012 |

# Test facilities (Safety)

Examples of test equipment/facilities

1 Power Supply
2 Digital Power Meter
3 Harmonic Power Analyzer
4 TW Oven (Endurance Tester for Control gear (incl. Ballast))
5 Luminance Meter / Flux Meter
6 Reference Lamps and Ballast
7 Leakage Current Meter
8 Hybrid Recorders
9 Humidity chamber
10 Test fingers – for protection against electric shock test
11 Test probes for IP tests
12 Material test facilities…ball pressure test, glow wire, tracking test, Needle Flame test
13 IP test apparatus – Splash test, water jet proof test,
14 Photobiological hazards test equipment (waiting delivery)
15 Others more…

# Performance Test

The performance tests and application of a performance standard are intended to check the principal performance of the electrical appliance/equipment; such as the followings for Lamps & accessories ;

a) Luminous flux
b) Lumen maintenance
c) Switching performance
d) Temperature dependency
e) Starting and run-up
f) Color Rendering Index (CRI)
g) Color Correlated Temperature (CCT)
h) Electrical parameters – P,V.I, PF, THD
i) Lamp Energy Efficiency or Lamp Efficacy

# Relevant Performance standard for LED Product Testing

| NO. | TITLE OF LED STANDARDS ON LIGHTING | LED Lighting & Accessories | TESTING STATUS |
|---|---|---|---|
| 1 | MS IEC 62384:2012 (P)<br>DC or AC supplied electronic controlgear for LED Modules<br>- Performance requirements |  | **Full facilities expected from Jul 2012** |
| 2 | MS 62504:2012 (P)<br>General lighting - LEDs and LED modules - Terms and definitions |   | **N/A: Definition only** |
| 3 | MS 62612:2012 (P)<br>Self-ballasted LED -lamps for general lighting services – Performance Requirements |   | Testing available for light output Measurement<br>(For endurance test, which testing duration is 25 % of rated life time up to a maximum of 6 000 hrs ~ 8 months) , equipment available but limited) - to propose the tests be conducted by manufacturer |

# Relevant Performance standard for LED Product Testing

| NO. | TITLE OF LED STANDARDS ON LIGHTING | TESTING STATUS |
|---|---|---|
| 4 | MS 62717:2012 (P)<br>LED modules for general lighting<br>- Performance requirements | Testing available for light output Measurement<br><br>For endurance test, which testing duration is 25 % of rated life time up to a maximum of 6 000 hrs (8 months) required per model - to propose the tests be conducted by manufacturer |
| 5 | MS 62722-1:2012 (P)<br>Luminaire performance<br>- Part 1: General requirements | Applicable for all type of luminaire<br>Goniophotometer /integrating sphere is required for light output measurement<br>For endurance test, which testing duration is 25 % of rated life time up to a maximum of 6 000 hrs (8 months) required per model.<br>Equipment not available or limited and it is advisable that the test be conducted by manufacturer |
| 6 | MS 62722-2-1:2012 (P)<br>Luminaire performance<br>Part 2-1: Particular requirements for LED Luminaires | Same as above |
| | | |

# *Test facilities (Performance)*

1. Integrating sphere system (medium size)
2. Luminance & Illuminance meter
3. Photometer & Spectroradiometer
4. Power Analyser for ballast efficiency & harmonics
5. Digital Power meter
6. Goniophotometer system (procurement process in progress)
7. Cyclic chamber

# TEST FACILITIES – Integrating Sphere

**Integrating Sphere complete with set of measuring equipment and software used for measuring LUMEN for all kind of light source such as LED, SSL, fluorescent lamp, halogen lamp, HID lamp.**

**This is required under the Energy Efficiency program for lamp by Suruhanjaya Tenaga (ST)**

**Measuring Method to:**
**- CIE (International Commission on Illumination) &**
**- IESNA (Illuminating Engineering Society of North America)**

**Measurements and reports include:**
- **Electrical parameter – P, I, V, PF**
- **Luminous flux**
- **Lumen Output**
- **Luminous efficacy**
- **Spectral radiant flux distribution graph**
- **Chromaticity chart**
- **Correlated Color Temperature (CCT)**
- **Colour Rendering Index (CRI)**

## Luminous flux

a unit of standard measurement that is used to describe the amount of light contained in an area as perceived by the human eye.

The more lumens, the brighter the light.

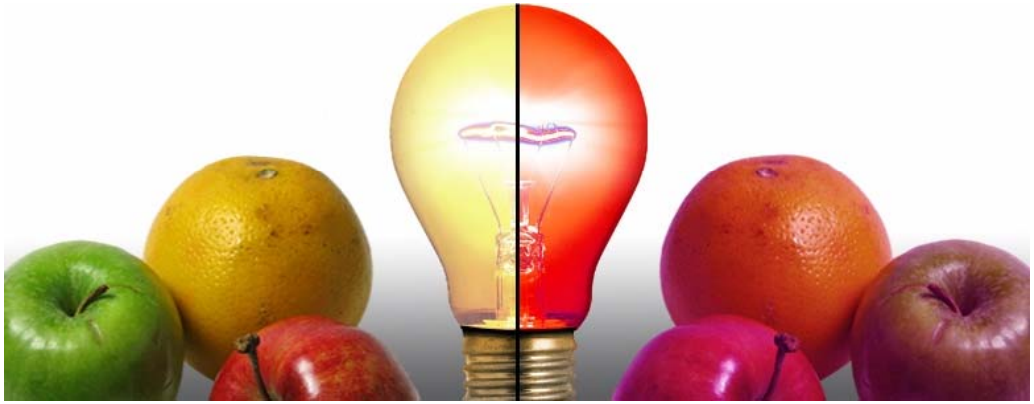
Lumens used to compare the brightness of any bulb, regardless of the technology behind it, and regardless of whether it's incandescent, fluorescent, CFL, LED and etc.

# Coloring Rendering Index (CRI), Ra

CRI represents the quality of light and its faithfulness to render colors correctly, that is, to enable us to perceive colors as we know them.

The ideal CRI is 100, 100% equal to Natural light - Sunlight

LEDs and CFLs use different design components in trying to equal the CRI of incandescent bulbs.

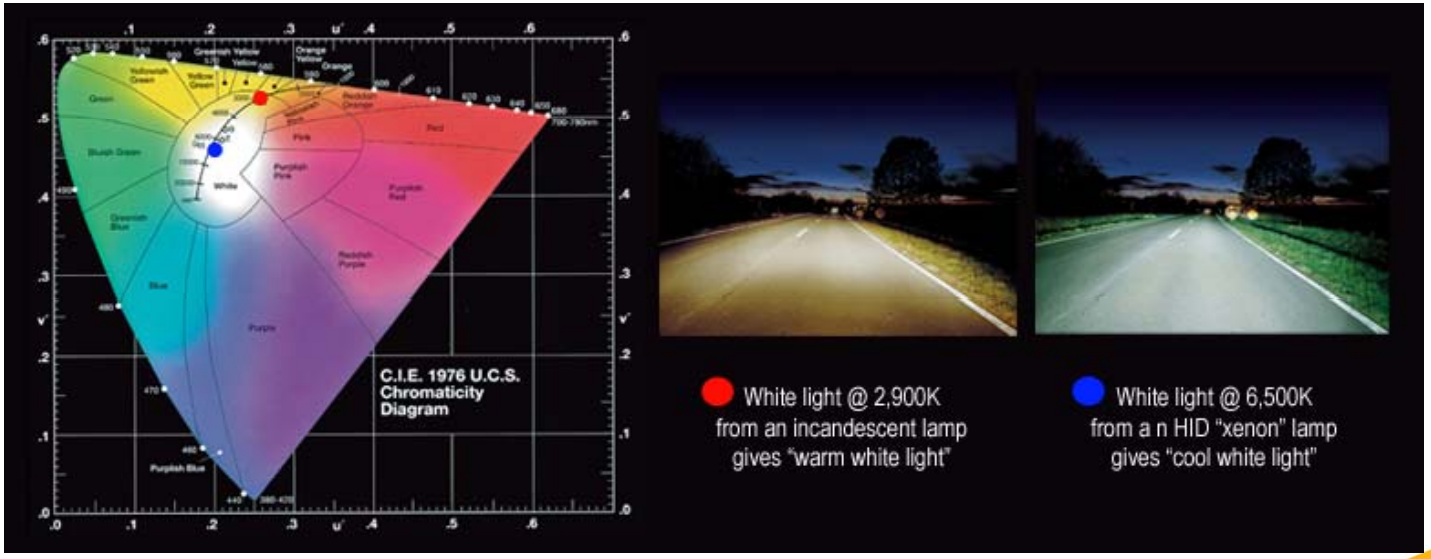


# Correlated Color Temperature (CCT)

**Describe the relative color appearance of a white light source.**

**CCT indicates whether a light source appears more yellow or more blue, in terms of the range of available shades of "white." , kelvins (unit of absolute temperature).**

**2700K is "Warm", 4500K is "Cool",  6500K is "Day light"**



# Photobiological safety of lamps and lamp systems

Photobiological hazards testing as IEC 62471

• evaluating the photobiological light effects on both skin and eyes from artificial optical radiation (but not Laser)

• including LEDs

•for wide wavelength range, from 200-3000nm.

The purpose of equipment is;

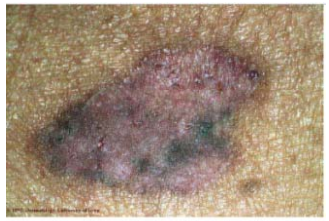
- to measure and to check the safety optical radiation for eyes protection

- to classify the performance requirements of non-laser product, direct ocular exposures and hazard distance as part of energy performance for labeling of LED/SSL lighting product.

# Photobiological Hazards of lamps

Six photobiological hazards expose to the skin and eyes.

| Hazard | Wavelength Range (nm) | Principle Bio-effects | |
|---|---|---|---|
| | | Skin | Eye |
| Actinic UV skin and eye† | 200-400 | Erythema (sunburn)<br>Elastosis (ageing, wrinkles) | Photokeratitis<br>Cataractogenesis |
| UVA eye | 315-400 | - | Cataractogenesis |
| Retinal blue-light† | 300-700 | - | Photoretinitis |
| Retinal thermal† | 380-1400 | - | Retinal burn |
| Infrared radiation eye | 780-3000 | - | Corneal burn<br>Cataractogenesis |
| Thermal skin | 380-3000 | Skin burn | - |



Skin cancer

Cataract

Sources of optical radiation are classified by IEC62471 into four hazard category groups, which are based upon the permissible exposure time before the hazardous dose is exceeded:

| Risk Group | Philosophical Basis |
|---|---|
| Exempt | No photobiological hazard |
| RG1 | No photobiological hazard under normal behavioral limitation |
| RG2 | Does not pose a hazard due to aversion response to bright light or thermal discomfort |
| RG3 | Hazardous even for momentary exposure |

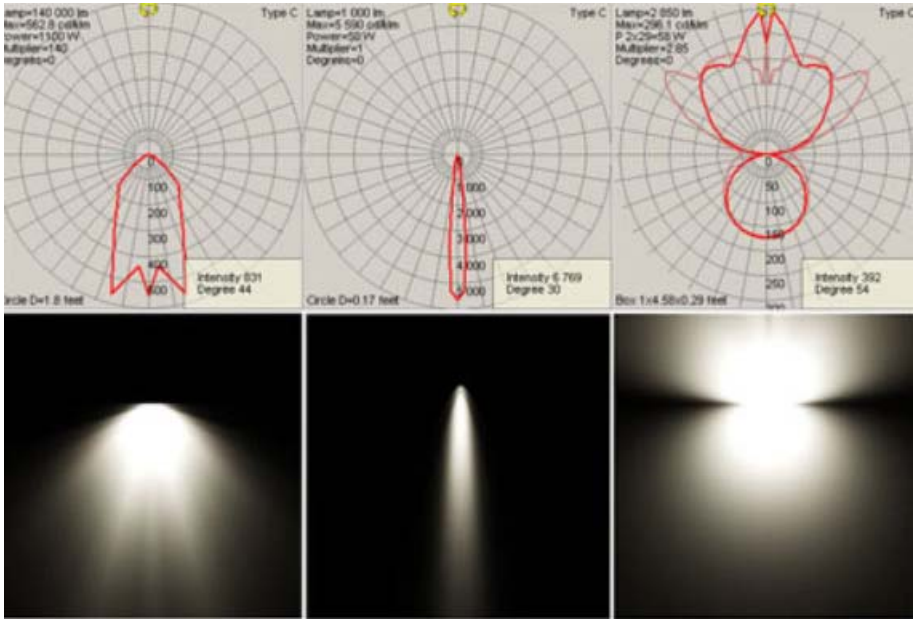
# *Lighting Photometry Testing with Goniophotometer*

•High-Speed Type C Mirror Goniophotometer for Electrical and Photometric measurements, light distribution of various lighting sources and fixtures including:

- Lamps
- Indoor Fixtures of luminaires
- Outdoor Fixtures of luminaires
- Street Lighting
- Flood Lighting
- Spotlights
- Flashlights
- Solid-State Lighting Products
- LED Lighting Products

# Lighting Photometry Testing with Goniophotometer

- Photometric Testing performs photometric (luminous flux) and goniophotometric measurements (luminous intensity versus angle) of architectural for the generation of:
  - CIE (International Commission on Illumination) and
  - IESNA (Illuminating Engineering Society of North America)
- Photometric Files for customers who are seeking to evaluate the photometric performance and lighting characteristic of their lighting products
- maximum lamp and luminaire size of 4 feet x 4 feet.



# What's New?

# NEW ENERGY EFFICIENCY LAB

**Officially launched on 15th May 2012 by Minister of KeTTHA Datuk Seri Peter Chin Fah Kui**

**Laboratory located in Jln Lada Sulah 16/11, Sec 16 Shah Alam, 3 kms away from SIRIM QASI HQ.**

**Facilities are available for:**
- **Refrigerator**
- **Electrical Lamp**
- **Air-conditioners (from Oct 2012)**

**Ready to accept application for testing services..**

Sirim opens RM8.2m energy efficiency lab

NSTP, 16 May

**SHAH ALAM:** Sirim Bhd has invested RM8.2 million to build an energy efficiency (EE) testing laboratory to support programmes and EE labeling of electrical equipment.

The EE testing laboratory, operated by its unit Sirim QAS International, will provide testing facilities for the local industry, especially manufacturers of air conditioners, refrigerators and lighting devices.

"This will ensure the local products meet the EE standards, allowing them to be marketed directly at the international level," Sirim chairman Datuk Jamaliah Kamis said.

Boosting energy efficiency

**POWER TRANSFORMATION INITIATIVE:** Companies, households to become more efficient in conserving energy

KUALA LUMPUR

MALAYSIA is serious in saving the planet and is embarking on various energy efficiency (EE) initiatives as part of efforts to power the national transformation initiative.

Malaysia is also aware that by improving EE, local companies will become more competitive and households can reduce electricity bills as well as lighten the cost of living for average Malaysians.

Before the country can become a high-income nation, it needs to improve EE at every level.

Sirim QAS International Malaysia, which is part of the country's certification and standard body Sirim, has embarked on a journey towards national economic transformation involving every household and every consumer.

Sirim QAS International launched the country's EE testing laboratory by Energy, Green Technology and Water Minister Datuk Seri Peter Chin Fah Kui yesterday.

EE is for all and improving it has been designated as one of the Entry Point Projects (EPPs) under the oil, gas and energy sector.

Malaysia has been found to be 34 per cent more energy intensive than its peers. Therefore, this EPP can be of great help in moderating the country's power and fuel consumption.

The Economic Transformation Programme (ETP) is the government's plan to transform Malaysia into a high-income nation by the year 2020.

The ETP will lift Malaysia's gross national income (GNI) per capita from US$6,790 (RM21,700) in 2009 to more than US$15,000 (RM46,000) in 2020, propelling the nation to a level on par with other high-income nations.

This GNI growth of six per cent per annum will allow Malaysia to achieve the targets set under Vision 2020 under the oil, gas and energy New Key Economic Area of the ETP.

The government has identified 12 Entry EPPs and two business opportunities for the oil, gas and energy sector. These EPPs will contribute RM178 billion to GNI to meet 2020 targets.

One of the five initiatives identified for improving energy efficiency in Malaysia has targeted end-users through the retailers of electronic appliances.

The initiative is intended to stimulate the sales of energy efficient appliances and will generate up to RM5.1 billion of GNI by 2020.

Through the initiative, consumers will receive rebates on particular appliances that account for the biggest part of household electricity bills, namely refrigerators and air conditioners.

Sirim QAS International is playing an important role in this initiative through testing and verification of appliances to determine energy performance.

The Performance Management and Delivery Unit (Pemandu) has appointed Sirim QAS International to provide energy efficiency testing for refrigerators, air conditioners, lamps and lighting devices to support this initiative.

Sirim QAS International will ensure that targeted energy efficient appliances, including refrigerators, air conditioners, lamps and lighting devices sold in Malaysia, are thoroughly tested, meeting globally recognised energy efficiency standards and regulations.

Since the appointment in January 2011, Sirim QAS International has taken extensive steps to ensure the timely establishment of its EE testing laboratory facilities.

These efforts include the procurement of two factory lots in Section 16, Shah Alam, for the site of the laboratory.

Today, the laboratory is ready to accept requests for energy efficiency testing of refrigerators, lamps and lighting devices.

By September, the laboratory will also offer energy efficiency testing for air conditioners.

The testing facility in Section 16, Shah Alam in Selangor adds to the existing range of Sirim QAS International's energy efficiency testing capabilities.

The existing laboratory, located at the headquarters of Sirim QAS International in Section 2, Shah Alam, currently conducts energy efficiency testing on domestically produced fans, televisions and ballasts for fluorescent lamps.

Sirim QAS International will gradually increase capabilities for the testing of other appliances in the future.

*Energy, Green Technology and Water Minister* ***Datuk Seri Peter Chin Fah Kui*** *(right) and Sirim QAS International testing services department senior general manager* ***Nur Fadhilah Mahammad*** *discussing the* ***energy efficient*** *testing services provided by the laboratory.* **Picture Caption Above**

SAVE ENERGY MONEY www.saveenergy.gov.my

completion in January 2013, the lab will be equipped with equipment, such as photobiological hazards, goniophotometer and cycle chamber.

# New EEST Customer Service Group (CSG)

- Started operation on 1st April 2012, at Building 11 & 12.

- In response to client's need; To serve our customers better.

1) The main objectives of this CSG are;

- 1) To provide service and technical support to client for any test application including;
  a) Have Technical discussion prior to test application/submission if necessary
  b) Provide Guidance on all necessary document and items required for application
  c) update applicant on progress of testing
  d) help customer to interpret and understand a test report

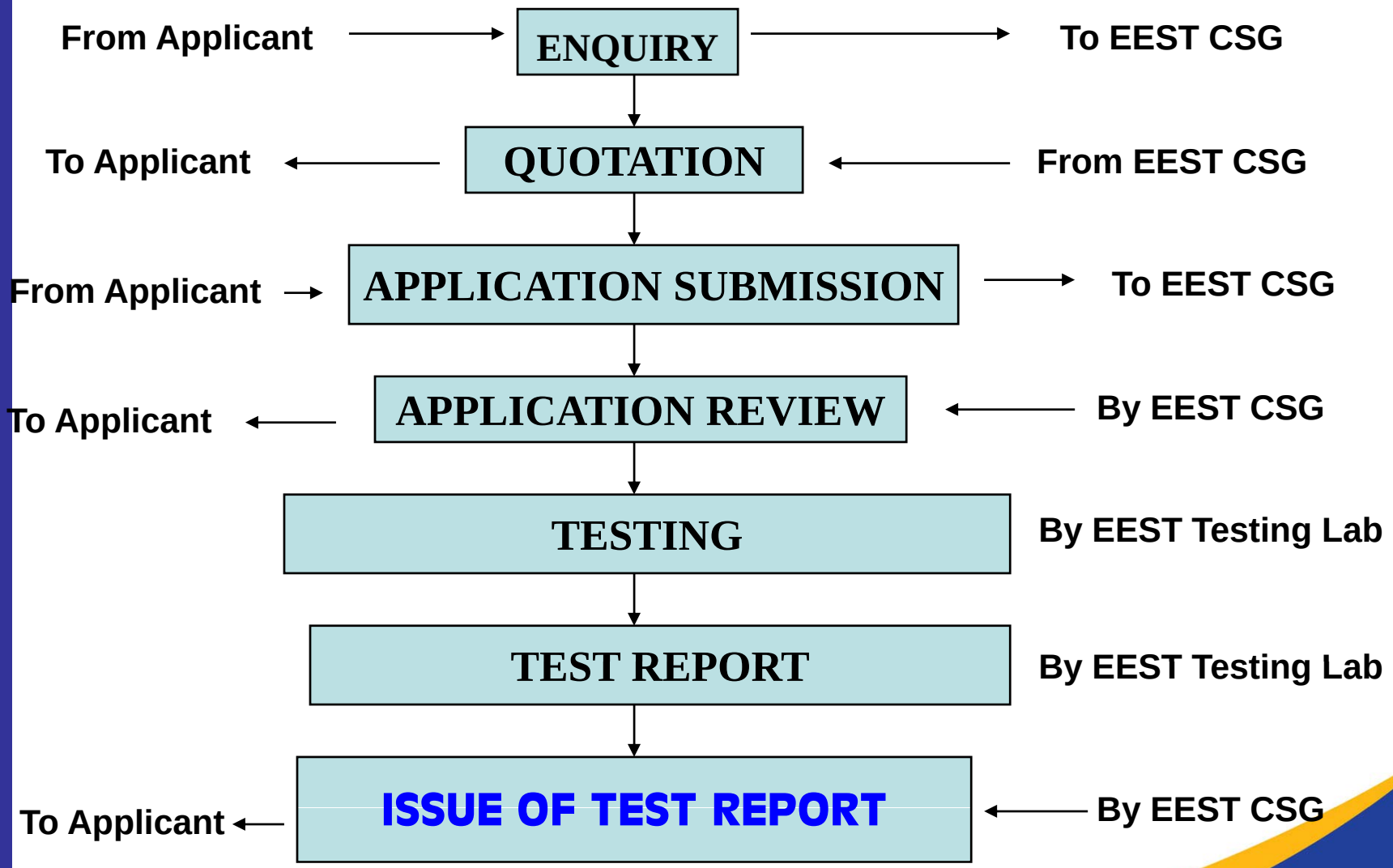
2) To provide a value added service ….such as "technical enquiry point" eg. CSG can help client with guidance and advice on relevant standards, identification of critical components and requirement for comp. certificates.

3) To attend to any enquiry from client including issuance of quotation

4) To liaise with client in case of product failure

5) To assist client in identifying test / regulatory / country requirement

# TEST ING APPLICATION



# Inquiries / Contact



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# *THANK YOU FOR YOUR ATTENTION*

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