

**COPPER SHEET
COPPER STRIP &
COPPER BUS BAR**

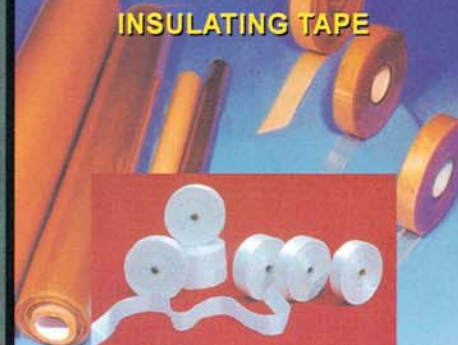


**ENAMELLED
COPPER WIRE**



**INSULATING
PAPER, SHEET, BOARD**

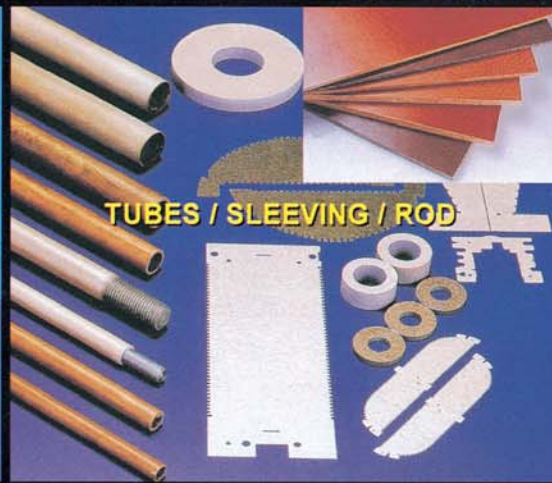
MODEL 5536-1



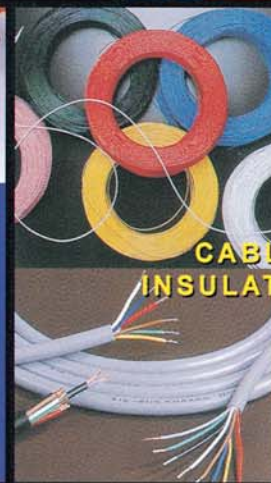
INSULATING TAPE



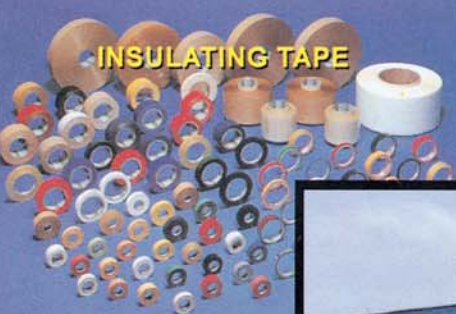
INSULATING FILM



TUBES / SLEEVING / ROD



**CABLE AND
INSULATING WIRE**



INSULATING TAPE



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前鋒電器有限公司



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STRIKER ELECTRIC SDN. BHD.** (86357-A)

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Fax: (603) 8922-1818(Sales), 8922-2828 (Account)

E-mail: sstriker@streamyx.com Website: www.striker.com.my

SABAH BRANCH: Tel: 088-421488 Fax: 088-439488

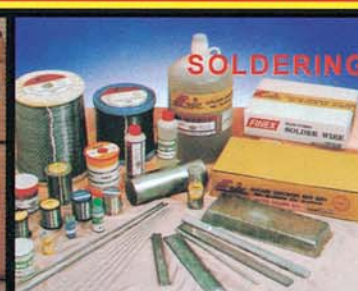
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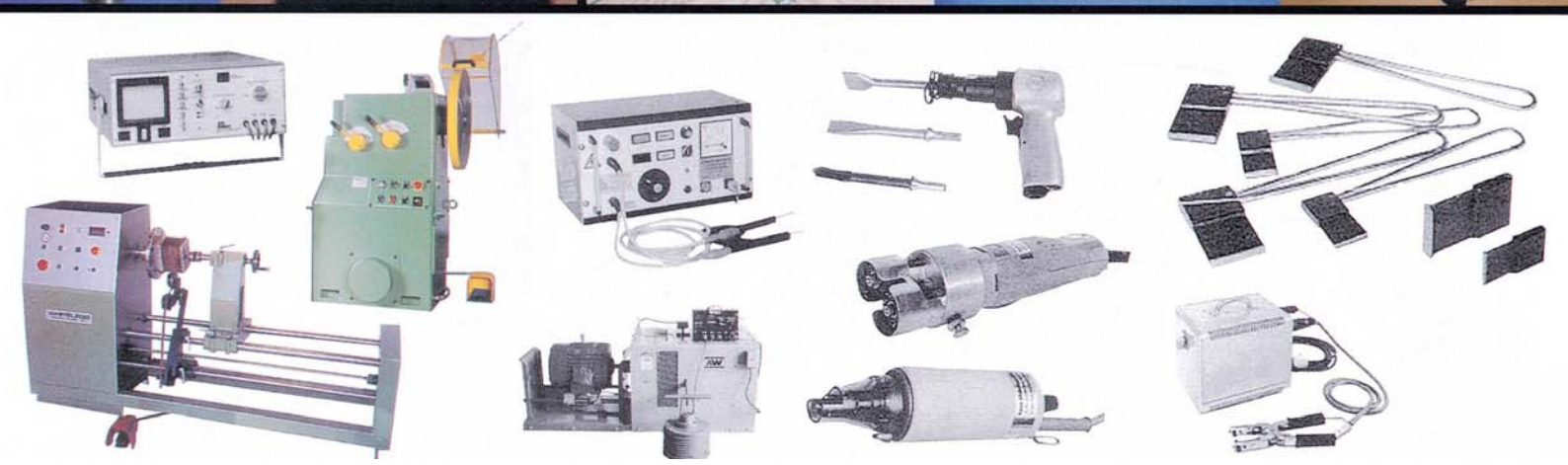
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TERMINAL & CONNECTOR



SOLDERING IRON, BIT & ELEMENT



Training on Infrared Thermography

On 15th July 2008, TEEAM and Como Engineering Sdn Bhd co-organised a 1-day training course on “Basic Infrared Thermography for Electrical Applications” at TEEAM conference room. The course aimed to provide an understanding on issues associated with performing infrared thermography electrical inspections, interpret infrared thermography survey results and prepare infrared thermography reports.

Course content included:

- Introduction / overview
- Heating effect in electrical equipment
- Heat transfer principles
- Qualitative vs quantitative thermography
- Instrument considerations
- Safety issues when inspecting live exposed electrical components
- Infrared electrical inspection techniques
- Reporting techniques
- Severity criteria
- Baseline and trending

Lecturer was Mr Othniel Lim, a HRDF certified trainer who has vast experience in infrared thermography applications.

Some 30 participants attended the course. Each received a certificate and acquired five

BEM CPD hours. Following the success of this first round of training on infrared thermography, TEEAM together with Como Engineering Sdn Bhd will organise a second session on 28th August 2008.

Please contact the TEEAM Secretariat for registration.

Tel: 603-9221 4417, 9221 2091

Fax: 603- 9221 8212

Email: teeam@streamyx.com



During lecture – Participants listening attentively to the lecture.



Lecturer – Mr Othniel Lim sharing his knowledge and experience.



For the album – Group photo of participants with speaker and Como official.



Wiremen Course - PW 1

Introduction

This Wiremen Course (PW 1) is designed to impart the needed skill and knowledge of electrical wiring works to the apprentice wiremen, and it is conducted in accordance with the syllabus for wiremen from the Energy Commission, Malaysia.

Eligibility

- Malaysian citizen
- Not less than 18 years of age
- Completed Form 3 level in government assisted schools
- Letter of recommendation from the employer
- Two (2) years working experience in electrical wiring with Electrical Contractors or Private Wiring Units REGISTERED with the Energy Commission, Malaysia.

Course Content

1. Acts and Regulations
Electricity Supply Act 1990. Electricity Regulations 1994. Wiring Regulations

2. AC and DC fundamentals

Measurement units. Power, current, voltage, inductance, capacitance. Series and parallel circuits.

3. Electrical drawings

Electrical layout diagram, wiring circuit diagram, schematic diagram, electrical symbols.

4. Cables, termination and joint

Types of wiring cables. Current carrying capacity. Types and methods of wiring joint.

5. Protection

Fuse, miniature circuit breaker and earth leakage circuit breaker. Types, operation and rating.

6. Electrical appliances

Water heater, discharge lamp, door bell, etc. Trace and rectify faults.

7. Administer safety practice

Apply first aid treatment. Safe usage of tools and equipment.

8. Test and measurement

Multi-tester, clamp tester, earth resistance tester and insulations tester. Operation and applications.

9. Wiring

Technique and methods. Types of final circuits. Consumer unit. Earthing. Lightning arrestors. Trace and rectify faults.

Course Fee

Course fee per participant is:

RM 1,800.00 (member)

RM 1,960.00 (non-member)

Examination & Certification

Candidates who pass all the tests will be awarded the Certificate of Competency as a Wiremen (PW 1).

For registration and further information, please contact the TEEAM Secretariat at:
Tel: 603-9221 4417, 9221 2091

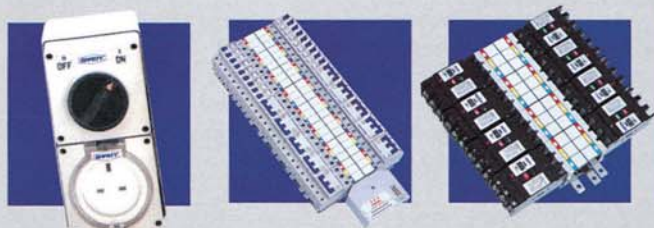
E-mail: teeam@po.jaring.my or

teeam@streamyx.com

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(Company No. 60122T)

Lot 10, Jalan Halba 16/16, 40000 Shah Alam, Selangor Darul Ehsan, Malaysia.

Tel: 603-5519 0888 Fax: 603-5519 9333, 5519 0777

E-Mail: safety@teknik.com.my URL: <http://www.teknik.com.my>

Marketing :



INDUSTRI SHAH ALAM
SDN. BHD.
(Company No. 170416U)

5th China - ASEAN Expo

A Chinese delegation from the China - ASEAN Expo Secretariat visited TEEAM on 20th May 2008. Accompanying the delegation was Mr Suresh Kumar Manager of East Asia/ASEAN Section, the International Network & Trade Promotion Division of MATRADE (Malaysia External Trade Development Corporation). They were here to promote the 5th China - ASEAN Expo (CAEXPO), an international trade event which has strong support from State leaders of China and ASEAN. The 5th CAEXPO will be held from 22nd to 25th October 2008 in Nanning, China. The event boasts 3,300 exhibition booths which will attract over 35,000 trade visitors. Major industrial sectors that will be featured are

machinery & equipment, building materials, electrical appliances, power transmission & distribution equipment and communication equipment. CAEXPO is a good platform for ASEAN products to enter the Chinese market.

For registration and details, please contact:

China - ASEAN Expo Secretariat
98 Zhuxi Avenue, Nanning, Guangxi,
P.R.China
Tel: 86-771-961236
E-mail: caexpo@caexpo.org

MATRADE
Tel: 603-6207 7103
Fax: 603-6203 7255
E-mail: omar@matrade.gov.my



Representatives from CAEXPO Desional & MAYRADE – (from left) Mr Suresh Kumar (Manager, East Asia/ASEAN Section, International Network & Trade Promotion Division of MATRADE), Ms Xin Huang (Senior Project Director of CAEXPO Secretariat), Mr George Cheng (Vice Division Director of CAEXPO Secretariat), Ms Li Ying (Senior Project Director of CAEXPO Secretariat) and Mr Jason Yin (Project Official of CAEXPO Secretariat).



Representatives from TEEAM – (from left) Mr David Chong Ah Nyap (Vice President), Engr Fu Wing Hoong (Deputy President) and Mr Jack Soon Lee Hock (Assistant Honorary Secretary).



Exchanging souvenir – A group photo taken for the album.



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& Class 1**



**MK3
Class 0.2s**



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4-Wire
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No. 22 & 22A, Jalan Anggerik Vanilla 31/93, Kota Kemuning, 40460 Shah Alam, Selangor, Malaysia.

Tel: +603-5122 0029 Fax: +603-5122 0079

Email: info@tms.com.my/sales@tms.com.my

Website: www.tms.com.my

Electrical Safety Car Sticker

TEEAM has launched and distributed car windscreen stickers to promote electrical safety. The launching was held on 31st July 2008 at Tropicana Golf & Country Club in conjunction with the TEEAM annual golf competition. TEEAM hopes that members will practise proper electrical safety and to promote safe electrical products. This is also an effort to promote TEEAM to the public. TEEAM requests for members' support to display the stickers on your company vehicles. The stickers can be obtained from the TEEAM Secretariat.

Be safe – TEEAM officials at the launching of TEEAM electrical safety car sticker. (from left) Mr Suresh Gorasia (Past President), Ir Chew Shee Fuee (Immediate Past President), Mr Jack Soon Lee Hock (Assistant Honorary Secretary), Dato' Ir Lee Peng Joo (President), Mr Ho Khai Hong (Council Member), Dato' Ir Donald Lim Siang Chai (Past President), Mr Yong Kim Yun (Auditor) and Mr Chong Yoon Koon (Council Member).





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Launching of Malaysia International Trade and Industry Report 2007

On 3rd July 2008, the Ministry of International Trade and Industry Malaysia (MITI) launched the 16th issue of the MITI report which aims to provide Malaysians with a summary and an update of the developments in trade and industry at both the national and international level in 2007.

YB Tan Sri Dato' Muhyiddin Mohd Yassin, Minister of International Trade and Industry announced that 2007 was the first time Malaysia recorded a surplus in services trade. The favourable services balance was attributed to a substantial increase in air passenger transportation into Malaysia and tourist spending. Exports of air passenger transportation increase by 89.4 per cent to RM 13.4 billion and tourist spending grew by 15.8 per cent to RM 43.5 billion. Collectively, these constitute 58.6 per cent of total services exports.

The strong performance of the manufacturing and services sectors reflected investors' confidence and Malaysia's attractiveness as an investment location for manufacturing and services. This performance is an indicator of the Malaysia's competitiveness as a base for exports of goods and services.

Tan Sri Dato' Muhyiddin highlighted that Malaysia today has improved its world competitiveness ranking to 19th position among 55 economies, from 23rd position in 2007. According to the world competitiveness yearbook 2008 issued by the Swiss-based Institute of Management Development, Malaysia has overtaken the United Kingdom,



Launching of the MITI report 2007 - YB Tan Sri Dato' Muhyiddin Mohd Yassin, Minister of International Trade and Industry giving a keynote address at the launching ceremony.

Japan, Thailand and the Republic of Korea in terms of competitiveness.

Since January 2008, import licence requirement on 37 tariff lines has been abolished. Among the products for which licences were removed are machinery and equipment used by the construction sector, fork-lift trucks, as well as magnetic tapes and sound recording apparatus. In 2007, the government also further liberalised the criteria for approval of import licences for tower and port cranes. Beginning January 2009, the government plans to remove import licence on an additional six tariff lines involving bulldozers. Licences on 13 other tariff lines involving cables and wires will be removed after technical standards for these products are adopted in 2009.

Recent global economic developments such as the slow down in the USA, weaker demand growth in Europe and Japan, and the rise in inflation owing to escalating energy and food prices are issues of concern to Malaysia. The prospects of the world economy in 2008 have become increasingly uncertain. Global output growth is expected to decline to 3.7 per cent

in 2008. Global trade is expected to grow at 4.5 per cent in 2008, less than the 5.5 per cent recorded in 2007.

These external factors indicate that the near future can be challenging for Malaysia. Nevertheless the business sector, in particular the services industry, must capitalise on its competitive advantage and potential growth given the growing demand for services in the international market. The manufacturing sector, in

general, must remain vigilant to these developments and respond appropriately to stay competitive.

The government will continue to work closely with the business sector to institute measures to further enhance the environment conducive for business activities, reduce the cost of doing business and foster closer collaboration to achieve the vision of Malaysia becoming a top global trading nation.



The Malaysia International Trade and Industry Report 2007 is available from the Strategic Planning Division of MITI at RM 60 per copy. For enquiry, please contact the division at Tel: 603-6203 4571 E-mail: mitiweb@miti.gov.my.



Building Wiring Installer Course

Introduction

This Building Wiring Installer training programme is designed for the construction personnel involved in the low voltage installation of electrical wiring and related electrical equipment. It is also a skill standard developed by the Construction Industry Development Board (CIDB) with participation of industrial experts from the public and private sectors.

Course Fee and Certificate

The course is sponsored by CIDB which is subject to approval.

Course participants who have achieved the skill competency requirement will be awarded with a certificate. In addition, a CIDB Green Card will also be issued.

Who Should Attend

This course is for schools leavers, do-it-yourself personnel, electrical worker at construction site, apprentice wiremen and other technical/non-technical staff.

For registration and further information, please contact the TEEAM Secretariat at Tel: 603-9221 4417, 9221 2091 or E-mail: teeam@po.jaring.my Website: www.teeam.com



The revolutionary
Full-Flat switch



State Associations News

Following are the reports of activities submitted by the various State Association Members of TEEAM.

Electrical Association of Sarawak & Sabah (EASS)

No. 2 A/F, 2nd Floor, Hardin Road, 96000 Sibu, Sarawak.
Tel: 6084-319 949 Fax: 6084-346 114, 325 112

26th AGM & Election

The Electrical Association of Sarawak & Sabah – EASS (formerly known as Electrical Association of 3rd, 6th & 7th Divisions, Sibu) has been reformed and renamed in order to establish a stronger reputation in Sarawak. The newly reformed association includes members from Tawau and Sandakan.

An election of new office bearers was held during EASS Annual General Meeting which was held on 31st March 2008. Mr Hii Hua Chuon was reelected as the Chairman.

EASS will be celebrating its 30th anniversary dinner. Some upcoming activities are wiring installation competition and first aid training course which will be held at the end of 2008.



Meeting in progress – A good turnout at the EASS 26th AGM.

Office Bearers of EASS for the term 2008 – 2010

Chairman	Hii Hua Chuon	Wireman Grade I	
Deputy Chairman	Tiong Chiong Kiing	Assistant	
1st Vice Chairman	Tie Deck Bee	Officer-in-charge	Hii Lu Hui
2nd Vice Chairman	Lee Joon Lee	Wireman Grade I	
3rd Vice Chairman	Datuk Hii Hua Seng	Assistant	
Secretary	Young Leh Luang	Officer-in-charge	Andam Ak Abong
Assistant Secretary	Yu Hieng Jeong	Wireman Grade II	
Treasurer	Ling Kung Leh	Officer-in-charge	Sii How Siang
Assistant Treasurer	Wong Choo Tiong	Wireman Grade II	
Supervisor	Goh Yew Hwong	Assistant	
Assistant Supervisor	Wong Ding Hie	Officer-in-charge	Ko Ing Yung @ Koh Ing Yung
Public Relation Officer	Ong Chet Kiong	Technician	
Welfare Officer	Chua Kian Guan	Officer-in-charge	Ding Tiing Hoh
Contractor		Technician Assistant	
Office-in-charge	Hii Tao Chin	Officer-in-charge	Liong Kah Li
Contractor Assistant		Technician Assistant	
Office-in-charge	Kapitan Ng Kian Ko	Officer-in-charge	Ling Ting Mong
Supplier		Education	
Officer-in-charge	Ling Soon Kiong	Officer-in-charge	Lau Ting Hui
Supplier Assistant		Education Assistant	
Officer-in-charge	Goh Kee Hin	Officer-in-charge	Chia Yik Chong
Air-conditioner		Tourism	
Officer-in-charge	Lau Kiing Yieing	Officer-in-charge	Tiong Nai Ming
Air-conditioner		Tourism Assistant	
Assistant		Officer-in-charge	Wong Kie Sing
Officer-in-charge	Moh Kee Tung	Committee Members	
Air-conditioner			Tiong Chen Kwong
Assistant			Wong Yek Kwong
Officer-in-charge	Ting Hung Ching		Lai Chiong Ann
Wireman Grade I			Wong Yuk Soon
Officer-in-charge	Wong Hock Chin		Sia Wee Ching
			Law Hieng King
			Wong Sie Hing
			Siew Ik Kiong

Academic Excellence Awards

The 6th academic excellence awards presentation was held during the AGM. Some 11 members' children were rewarded for their academic excellence in their UPSR, PMR, SPM and STPM examinations.



Well done – Mr Hii Hua Chuon (EASS Chairman) presenting an award to a recipient.

Factory visit

The EASS organised a factory visit on 7th June 2008 to the largest cable production manufacturer in Sarawak ie Universal Cable (Sarawak) Sdn Bhd. The delegation was led by the Chairman, Mr Hii Hua Chuon. Mr Benz Ching (Senior Manager of Universal Cable Sarawak) received the delegation and gave a guided tour.



For the album – A group photo taken at the factory.

Meeting with PKK

EASS had a meeting with Contractor Services Centre (PKK) on 24th May 2008. PKK informed that effective 1st June 2008, Sarawak electrical personnel can renew their 1st, 2nd and 3rd degree grade PKK licences in Kuching. En Abg Mustapha Abg Hamkah (PKK Director, Sarawak) announced the good news to members of EASS. Previously these licences have to be renewed in West Malaysia.



At the meeting – (2nd right) Mr Hii Hua Chuon (Chairman of EASS) and (3rd from right) En Abg Mustapha Abg Hamkah (PKK Director, Sarawak) discussing the licence renewal issue.



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tel: 603-8024 1215 fax: 603-8024 1796 email: utamassb@tm.net.my

Badminton Tournament

EASS and Syarikat SESCO Berhad co-organised a 3-day badminton tournament from 25th to 27th March 2008. The objective is to maintain a good working relationship with each other.



Bravo! – Committee Members posing with players and their families after the prize presentation.

Networking with SEA

EASS, led by the Chairman Mr Hii Hua Chuon, led an 18-member delegation to network with members of Sarawak Electrical Association (SEA) on 14th August 2007. He urged to have a healthy competition ie compete on quality and service rather than price war. Trustworthiness is key to maintain our standing in the electrical fraternity.



For the album – Members of EASS and SEA posing for a group photo. Seated sixth from right is Mr Hii Hua Chuon (EASS Chairman). Mr Bernard Tan Hak Koon (SEA Chairman) is seated fifth from left.

Visit to Hong Kong Electronics Fair

A 5-member delegation from EASS visited the Hong Kong Electronics Fair which was held from 14th to 17th April 2008 at Hong Kong Convention and Exhibition Centre, Wanchai, Hong Kong. The fair showcased electronic manufacturing services (EMS), telecommunication products, electronic parts, components & production technology, lighting products and office automation & equipment.



Visitors from EASS – A group photo taken at the exhibition.



Johor Bahru Electrical & Electronics Association

No.7-01, Jalan Bentara Luar, Taman Iskandar,
80050 Johor Bahru, Johor Darul Takzim.
Tel: 607 - 333 8174 Fax: 607 - 224 1923
E-mail: jatco@pd.jaring.my/
i-bon@streamyx.com

30th Annual Dinner & Karaoke Competition

Johor Bahru Electrical & Electronics Association (JBEEA) celebrated its 30th anniversary on 14th June 2008 at Restoran Daiman Pekin, Johor Bahru. A karaoke competition was organised to add fun to the dinner. TEEAM Vice President, Ir Steven Ng Khooon Hwa and his wife and TEEAM Council Member, Mr Ho Khai Hong represented TEEAM at the dinner. Some 350 members and guests attended the dinner.



All smiles – TEEAM representatives with JBEEA Committee Members on the stage.

Briefing on TNB e-Application

A half day briefing on TNB e-Application was held on 7th May 2008 at Wisma TNB, Johor Bahru. The briefing attracted 150 attendees.



At the briefing – All attendees listening attentively to the briefing.

Sandakan Electrical Engineering Association, Sabah

Block A, Lot No. 1, 2nd Floor, Bandar Tong Huat,
Batu 3, Jalan Utara, 90000 Sandakan, Sabah.
Tel: 6089 - 213 978 Fax: 6089 - 213 978
E-mail: suntronic_sdk@yahoo.com

New President for the year 2008 – 2009

The Sandakan Electrical Engineering Association (SEEA) held its Annual General Meeting and election of office bearers for the year 2008 – 2009 recently. The newly elected President is Mr Lim Lip Kee.

Office Bearers of SEEA for the term 2008-2009

President	Lim Lip Kee
Assistant President	Chin Tze Min
Secretary	Donny Wong Sui Dat
Assistant Secretary	Chin Pit Vui
Treasurer	Chong Vui Keong
Committee	Voo Yui Yun Chin Yau Cheong Chin Nyen Yew Koh Ming Ying



Mr Lim Lip Kee – SEEA newly elected President.



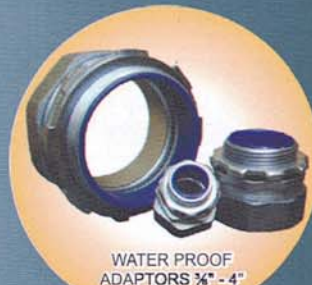
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Email: wetkl@wongelectrical.com.my Website: www.wongelectrical.com.my



Penang Electrical Merchants' Association

No. 171A, Malacca Street, 10400 Penang.
Tel: 604 - 229 0195 Fax: 604 - 228 4233
E-mail: pema@streamyx.com
Website: www.pema.org.my

Council Meeting at KLCC

The Penang Electrical Merchants' Association (PEMA) attended the TEEAM Council Meeting on 17th June 2008 at Kuala Lumpur Convention Centre. A 9-member delegation led by the President, Mr Teoh Yew Yean attended the meeting and visited the Electric Asia 2008 exhibition which was held in tandem.



At the meeting - (left) Mr Choo Kwang Hwa (Past President) and Mr Teoh Yew Yean

TNB E-Application Briefing

On 9th May 2008, a TNB E-Application briefing was organised by TNB at Wisma TNB, Penang for PEMA members. The E-Application is a web base system linked from TNB webpage for new domestic application. More than 35 participants from PEMA including President, Mr Teoh Yew Yean attended the briefing.

Academic Award 2008

The PEMA academic excellence award 2008 was held on 3rd August 2008 at Bukit Jambul Penang. There were 23 recipients for the UPSR examination, 17 recipients for the PMR examination, 14 recipients for the SPM examination and seven recipients for the STPM examination. They were rewarded with cash award totaling RM 9,750 and certificates for their excellent performance in their examinations. The award is aimed to give due recognition to children of PEMA members and children of their employees who have done well in their examinations. PEMA also presented "TEEAM Book Prize" to six recipients of USM undergraduates on TEEAM's behalf.



TEEAM Book Prize - Mr Teoh Yew Yean (PEMA President) presenting book prize to USM undergraduate on TEEAM's behalf.



Well done! - A group photo taken for the album.



The Perak Electrical Association

No. 12-A, Jalan Datuk Mahmud,
31650 Ipoh, Perak Darul Ridzuan.
Tel: 605 - 254 1502 Fax: 605 - 250 9145
E-mail: multi99@streamyx.com

Council Meeting at KLCC

Representatives from the Perak Electrical Association (PEA) attended the TEEAM Council Meeting which was held on 17th June 2008 at Plenary Hall of Kuala Lumpur Convention Centre.



Support from PEA - (left) Mr Lim Chun Sing (PEA Member) and Mr Chan Kaim Sam (PEA Deputy President) at the TEEAM Council Meeting.



Visit to Electric Asia 2008

The Electric Asia 2008 was held from 17th to 20th June 2008 at Kuala Lumpur Convention Centre. Mr Chan Kaim Sam (PEA Deputy President) and Mr Lim Chun Sing (PEA Member) also visited the fair after the TEEAM Council Meeting.

At the exhibition - A photo taken for the album.

Other State Association Members' contacts:



Negeri Sembilan Electrical Engineering Association

c/o No. 194, Jalan Pantai, 71000 Port Dickson.
Tel: 606-647 1105 Fax: 606-647 4728



Sabah Electrical Association

Lot No. 3-3-R, Beverly Hills Plaza, Jalan Bundusan,
88300 Kota Kinabalu, Sabah.
Tel: 6088 - 712 358 Fax: 6088 - 717 358
E-mail: pes233@tm.net.my



Sarawak Electrical Association

Lot 412, (2nd Floor), Lorong 11D,
Off Jalan Ang Cheng Ho, 93700 Kuching, Sarawak.
P. O. Box 1494, 93730 Kuching, Sarawak.
Tel: 6082 - 423 145 Fax: 6082 - 429 011
E-mail: btanakkoon@yahoo.com



Malacca Electrical Contractors and Traders Association

No. 389-G1, Taman Pringgit Jaya,
Jalan Mata Kuching, 75400 Melaka.
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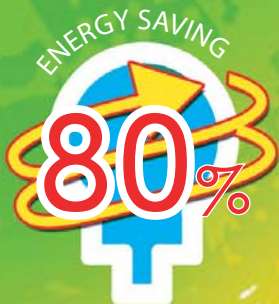
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New Members

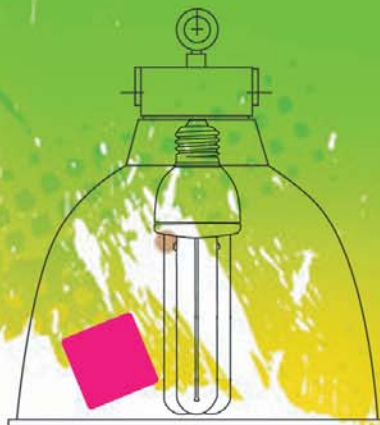
The following new members have been approved and accepted by the TEEAM Council (as at 17th June 2008). A warm welcome to all the new members and special appreciation is extended to those who introduced these new members. For those who are not yet members.....why wait? Join us and find out how our Association can offer our services to you.

Behr Bircher Cellpack BBC Malaysia Sdn Bhd No. 8, Jalan TU 51, Taman Tasik Utama, Ayer Keroh, 75450 Melaka. Tel: 606-251 9530 Fax: 606-251 9531 E-mail: info@cellpack.com.my Website: www.cellpack.com.my Contact Person: Mr Hanspeter Ritzmann Business: Medium voltage advanced connectors.	IBC Solar Teknik Sdn Bhd A 902, 9th Floor, Block A, Kelana Square, No. 17, Jalan SS 7/26, Kelana Jaya, 47301 Petaling Jaya, Selangor Darul Ehsan. Tel: 603-7494 0441 Fax: 603-7804 8440 E-mail: ibcst@streamyx.com Website: www.ibt-solar.com Contact Person: Encik Ahmad Nazri Bin Ibrahim Business: Trading of solar equipment.
Buler Engineering Sdn Bhd No. 3-2, Jalan Merpati, Tanamera, 47650 Subang Jaya, Selangor Darul Ehsan. Tel: 603-5191 8998 Fax: 603-5191 9889 E-mail: buler.eng@gmail.com Website: www.buler.com.my Contact Person: Encik Ramli Bin Hassan Business: Engineering of structural cabling system.	Infrakomas Sdn Bhd No. 2, Jalan Pengetua U1/32, Hicom-Glenmarie Industrial Park, 40150 Shah Alam, Selangor Darul Ehsan. Tel: 603-5569 3237 Fax: 603-5569 3236 E-mail: infrakomas@ifk.com.my Website: www.ifk.com.my Contact Person: Ir Mohd Redza Bin Mahmood Business: Mechanical and electrical engineering services.
Chubb Malaysia Sdn Bhd Kompleks Sime Darby, Persiaran Kewajipan, USJ 7, 47600 UEP Subang Jaya, Selangor Darul Ehsan. Tel: 603-5635 3050 Fax: 603-5635 3066 E-mail: ravin@chubbsafes.com.my Contact Person: Mr Ravindran Gengadaran Business: Manufacturing and marketing of electronics & physical security equipment.	Lightning Power Surge Protection Sdn Bhd E-02-03, 3rd Floor, Subang Square Business Centre, Jalan SS 15/4G, Subang Jaya, 47500 Selangor Darul Ehsan. Tel: 603-5621 3630 Fax: 603-5638 8248 E-mail: lawrence.lai@lightningpowersurge.com Website: www.lightningpowersurge.com Contact Person: Mr Lawrence Lai Business: System integration, power quality and energy efficiency.
Critical System Specialist Sdn Bhd No. 23, Jalan 109E, Desa Business Park, Jalan Desa, Taman Desa, 58100 Kuala Lumpur. Tel: 603-7980 0075 Fax: 603-7980 0821 E-mail: css@criticalsystem.net Website: www.criticalsystem.net Contact Person: Mr Ho John Chan Business: Mechanical and electrical.	Top Ledtronics Enterprise No. 32A, Jalan Perdana 2/24, Pandan Perdana, 55300 Kuala Lumpur. Tel: 603-9285 1991 Fax: 603-9283 7301 E-mail: topledtronics@gmail.com / yfchin33@yahoo.com Website: www.topledtronics.com Contact Person: Mr Jon Chin Business: Supply all kind of LED products.
Best Energy Saving Technology Sdn Bhd No. 334, Jalan Jelutong, 11600 Pulau Pinang. Tel: 604-283 8373 Fax: 604-283 6128 E-mail: jootan@hotmail.com Website: www.be1stlight.com Contact Person: Mr Tan Joo Koon Business: Electronic ballast and PLCE.	JT Power Electrical Sdn Bhd No. 16, Jalan Faedah 25/86, Section 25, Taman Sri Muda, 40400 Shah Alam, Selangor Darul Ehsan. Tel: 603-5124 7821 Fax: 603-5122 7434 E-mail: mreelite@streamyx.com Contact Person: Mr Jamanhi a/l Thandamoorthy Business: Electrical engineering services.
Hakikat Engineering Sdn Bhd No. 16-3, Jalan Puncak Setiawangsa 4, Taman Setiawangsa, 54200 Kuala Lumpur. Tel: 603-4252 2780, 4252 2793 Fax: 603-4252 2513 E-mail: hesb20002000@yahoo.com Contact Person: Encik Mohamad Basri Nor Business: Civil and mechanical and electrical engineering.	Lian Wah Engineering Sdn Bhd SD 16, Jalan KIP 11, Taman Perindustrian KIP, 52200 Kuala Lumpur. Tel: 603-6274 6688 Fax: 603-6274 2787 E-mail: lwkl@streamyx.com / info@lianwah.com.my Contact Person: Mr Eow Chai Huat Business: Mechanical and electrical, cleanroom architecture contractor.
Process Integrator (M) Sdn Bhd Suite B2-120 (Ground Floor), Leisure Commerce Square, No. 9, Jalan PJS 8/9, 46150 Petaling Jaya, Selangor Darul Ehsan. Tel: 603-7877 3172, 7877 6302 Fax: 603-7877 4629 E-mail: process@process-integrator.com Website: www.process-integrator.com Contact Person: Mr Woo Yean Lum Business: Automation control, process-integration, robotic, ERP and system integrator.	Timecom Holdings Sdn Bhd No. 33, Jalan Radin Anum 2, Bandar Baru Sri Petaling, 57000 Kuala Lumpur. Tel: 603-9057 1858, 9059 1858 Fax: 603-9059 2868 E-mail: fadilah@timecom.com.my Website: www.timecom.com.my Contact Person: Puan Fadilah Haji Karim Business: ICT system integration, software development, hardware distribution and maintenance.
Kejuruteraan Warisan Teknik Sdn Bhd No. 57, Jalan 1/149J, Seri Petaling, 57000 Kuala Lumpur. Tel: 603-9059 1710, 9059 1712 Fax: 603-9059 1685 E-mail: warisanteknik@gmail.com Contact Person: Tuan Haji Ismail Bin Haji Abu Bakar Business: Electrical contractor.	YME Engineering Sdn Bhd No. 63, Jalan Hujan, Taman Overseas Union, 58200 Kuala Lumpur. Tel: 603-7782 6888 Fax: 603-7784 6188 E-mail: melanietabl@gmail.com Website: www.yolek.com.my Contact Person: Mr Tan You Joo Business: M & E contractor.
Kelip-Kelip Marketing Sdn Bhd No. 334, Jalan Jelutong, 11600 Pulau Pinang. Tel: 604-283 8373 Fax: 604-283 6128 Contact Person: Ms Liow Lih Na Business: Emergency light and exit light.	TEEAM offers BRIS Search Services Contact the Secretariat for details: Tel: 603-9221 4417 E-mail: teeam@po.jaring.my Website: www.teeam.com

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New Books in Our Library

Informative reference materials are available in our Library. The Library is open to members from 9:00 am to 5:45 pm, Monday to Friday.

Title : ACCCIM Bulletin, June 2008 Publisher : The Associated Chinese Chambers of Commerce and Industry of Malaysia	Title : Electrical Building Technology Guangzhou, Official Catalogue Publisher : Guangzhou Guangya Messe Frankfurt Co. Ltd.	Title : Industrial Automation Asia, June/July 2008 Publisher : Eastern Trade Media Pte Ltd
Title : Annual Report 2007 Publisher : Department of Standards Malaysia	Title : EUMCCI Review, July 2008 Publisher : European Union-Malaysia Chamber of Commerce and Industry	Title : Malaysia International Trade and Industry Report 2007 Publisher : Ministry of International Trade and Industry Malaysia
Title : Annual Report 2007 Publisher : Pembangunan Sumber Manusia Berhad, Kementerian Sumber Manusia	Title : FMM Directory 2008, 39th Edition Publisher : Federation of Malaysian Manufacturers	Title : MASSA News, June 2008 Publisher : Malaysia South-South Association
Title : Asean Biggest Mechanical & Electrical Show 2008 Publisher : AMB Exhibitions Sdn Bhd	Title : Guangzhou International Lighting Exhibition, Official Catalogue Publisher : Guangzhou Guangya Messe Frankfurt Co. Ltd.	Title : Master Builders Journal, 1st Quarter 2008 Publisher : Master Builders Association Malaysia
Title : Berita FMM, July-August 2008 Publisher : Federation of Malaysian Manufacturers	Title : HKECA News, July 2008 Publisher : Hong Kong Electrical Contractors' Association	Title : MGCC Quarterly, July/August 2008 Publisher : Malaysian-German Chamber of Commerce and Industry
Title : The Berita KLSCCCI, April-July 2008 Publisher : Kuala Lumpur & Selangor Chinese Chamber of Commerce & Industry	Title : IEEMA Journal, July & August 2008 Publisher : Indian Electrical & Electronics Manufacturers' Association	Title : Naphthenics, 2/2008 Publisher : Nynas AB
Title : Berita MFPA, First Issue 2008 Publisher : Malaysian Fire Protection Association	Title : Jurutera, July 2008 Publisher : The Institution of Engineers, Malaysia	Title : Suara Perunding Publisher : Association of Consulting Engineers Malaysia
		Title : Singapore Electronics Trade Directory 2006/2007 Publisher : Singapore Information Services Pte Ltd
		Title : The Ingenieur, June-August 2008 Publisher : Board of Engineers Malaysia



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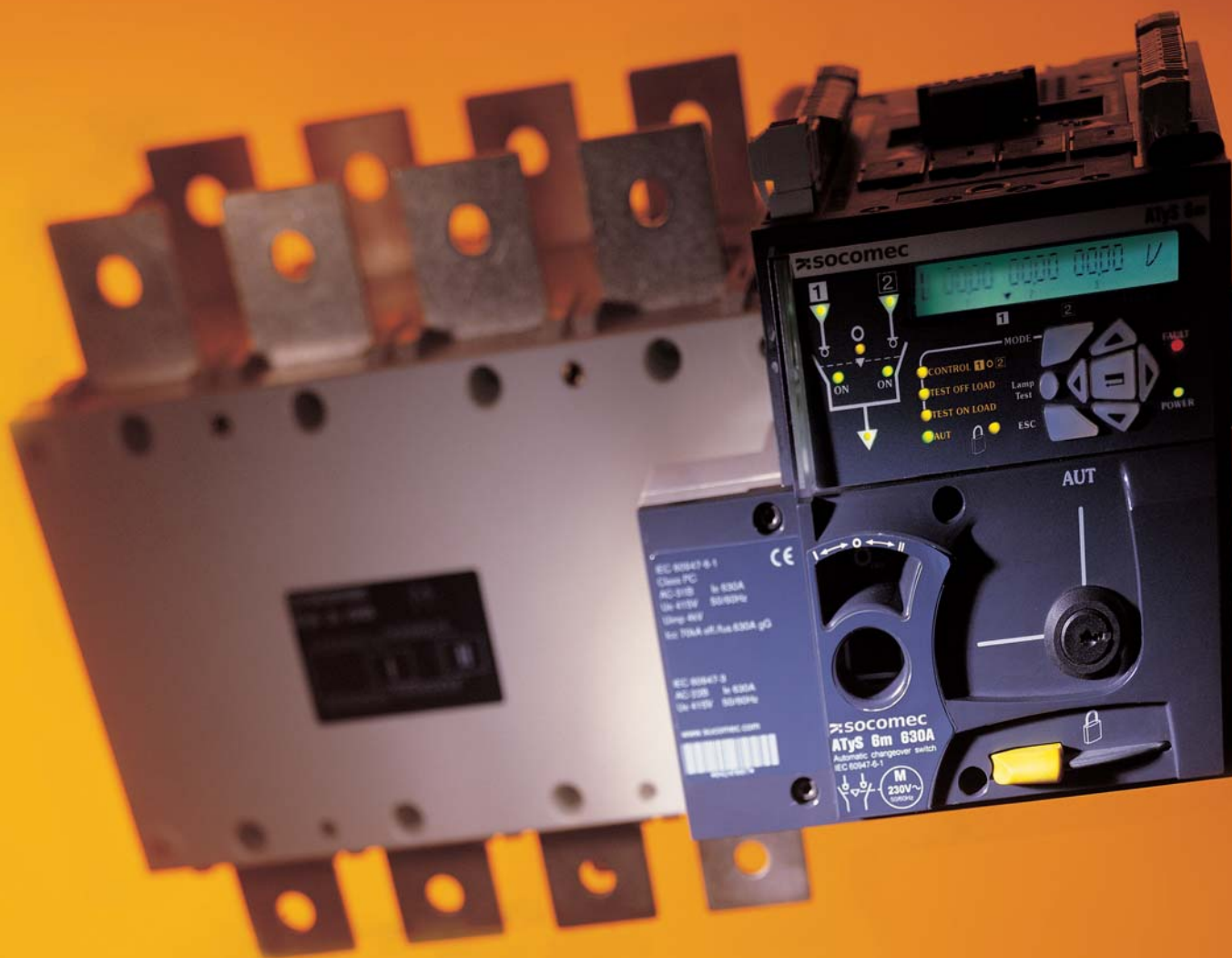
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Challenges and Opportunities in Electrical Industry - Part 9

This paper was prepared by Ir Chew Shee Fuee, TEEAM Immediate Past President.

Circulars from Suruhanjaya Tenaga

Suruhanjaya Tenaga (ST) had issued a number of circulars that will be of interest to you.

The cessation of Restricted Chagemen Application

Pekeliling Bahagian Kawaselia Keselamatan Elektrik Suruhanjaya Tenaga Bilangan: 3 Tahun 2007.

Pekeliling Mengenai Pemberhentian Pengeluaran Perakuan Kekompetenan Penjaga Jentera Terhadap - Dated 12th June 2007.

According to the circular no new application for Restricted Chagemen will be allowed. However existing Restricted Chagemen will be allowed to continue their current work until further notice.

The reason for the cessation is on the basis that 30,400 registered Chagemen are now available for the market. The situation of shortage of Chagemen is now no longer relevant.

The requirement of Competent Person for Electrical Supervision

Pekeliling Jabatan Keselamatan Elektrik Suruhanjaya Tenaga Bilangan: 4 Tahun 2007.

Surat Pekeliling Mengenai Keperluan Lawatan Pemeriksaan Orang Kompeten Di Pemasangan Elektrik - Dated 14th December 2007.

Suruhanjaya Tenaga had been informed that Electrical Supervision of Installations was carried out by representatives of the Competent person in some cases. These representatives do not possess the required competency. This circular is meant to give a warning that such practice will cause the Competent person registered for the installation to have his Competency suspended.

The usage of Malaysian Standards

Pekeliling Jabatan Keselamatan Elektrik Suruhanjaya Tenaga Bilangan: 1 Tahun 2008.

Pemakaian Standard-Standard Berikut:

- (i) **MS IEC 60364 - Electrical Installations of Buildings.**
- (ii) **MS 1936:2006 - Electrical Installations of Buildings - Guide to MS IEC 60634; and**
- (iii) **MS 1979:2007 - Electrical Installations of Buildings - Code of Practice**

Sebagai Garispanduan Pemasangan Di Pemasangan Semenanjung Elektrik Dalam Industri Bekalan Elektrik Di Semenanjung Malaysia Dan Sabah.

The above mentioned Standards, Guide and Code of Practice were the work of TEEAM as a Standard Writing organisation. Basically the Standards were adopted from IEC 60364 but the Guide and Code of Practice were produced by TEEAM.

Electrical Wiring Guide on Domestic Wiring

Pekeliling Jabatan Keselamatan Elektrik Suruhanjaya Tenaga Bilangan: 2 Tahun 2008 - Dated 1st July 2008.

Pemakaian Garis Panduan Pendawaian Elektrik (GPPE) di Bangunan Kediaman di Semenanjung Malaysia dan Sabah.

The above guide was drafted by Suruhanjaya Tenaga with many relevant organisations including TEEAM. It is a brief and practical

approach to domestic wiring in accordance to MS IEC 60364.

Opportunities for EE and RE

The escalation of oil price and electricity tariff will now hasten the development in Energy Efficiency (EE) and Renewable Energy (RE). Many projects will become more viable and attractive due to rise of fuel cost.

If you are new to EE it may be a golden opportunity for you to participate in the training in Japan organised by TEEAM and AOTS. It will cost around RM6,500.00 per person for a period of 2 weeks. This cost is however subsidised and will be an opportunity not to be missed. It has taken TEEAM more than 4 years to realise this training course. We appreciate your support to take part.

Guidance for the correct use of residual current-operated protective devices (RCDs) for household and similar use - IEC TR 62350

The above is currently being discussed for adoption. It provides solutions to most cases of unwanted RCD trippings. The understanding of leakage current levels of office and computer equipment is important in the application of RCDs. The availability and usage of S type RCDs has also been mentioned. We hope this document will become a Malaysian Standard soon.

Ir Chew Shee Fuee B.Sc. (Hons) (Strathclyde), PEng, CEng, FIEM, MIEE Member, IEEE Member, 1st Grade Electrical Engineer (Competent up to above 500 kV).

Ir Chew is the President of The Electrical and Electronics Association of Malaysia (TEEAM) for 2001 - 2003 and 2003 - 2005. He is the Past President of the Asean Federation of Electrical Engineering Contractors (AFEEC).

Ir Chew is the Managing Director of G. H. Liew Engineering (1990) Sdn Bhd and QATM Engineering Services Sdn Bhd. He graduated from the University of Strathclyde, Glasgow with a B. Sc (Hons) in Electrical & Electronics Engineering. He is a Professional Engineer and is also licensed by Energy Commission as a competent engineer (without voltage limits) and a service engineer to carry out electrical testing up to a voltage of 500 kV.

Ir Chew has 26 years experience in electrical control and relay protection. He is also specialised in electrical site tests on power equipment, electrical fault investigation, service and maintenance of electrical switchgear and relays. His work also includes electrical supervision of substations and electrical audit. He presents lectures on electrical apparatus and the protection system. He can be reached at E-mail: sfchew@ghliew1990.com

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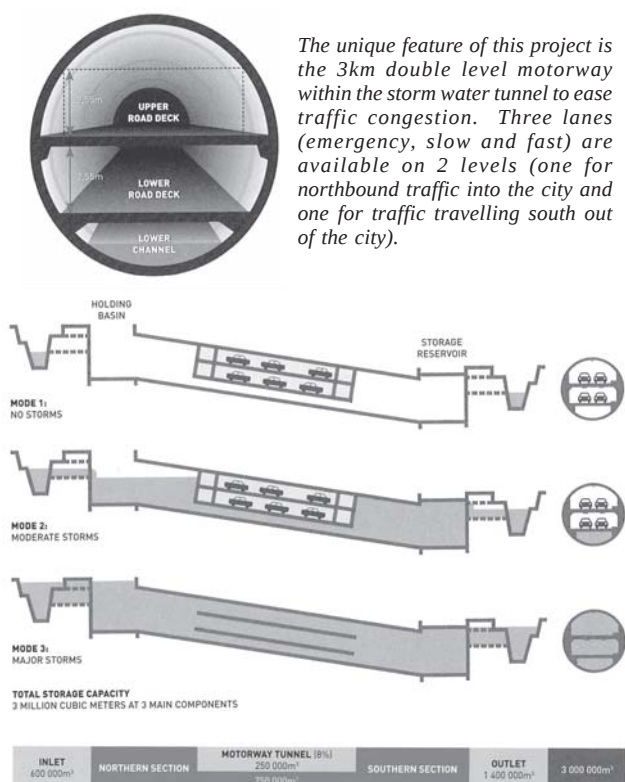
A Dual-Purpose Tunnel

Kuala Lumpur, Malaysia

Recurring floods and ongoing traffic congestions were having an adverse effect on Kuala Lumpur's business district. A single solution to solve both problems was the innovative concept of constructing the world's first dual-purpose tunnel capable of carrying vehicles and channelling storm water - the Stormwater Management and Road Tunnel (SMART), opened in May 2007.

The city of Kuala Lumpur was suffering from increasing flooding by water from the Klang River during heavy rain, resulting in traffic grinding to a standstill on the overloaded ring roads. The only feasible method of flood control was to build a tunnel to divert the water before it entered the critical area. At the design stage, the original idea arose of also using this tunnel to tackle traffic congestion.

Straits Design, a member of the Schreder Group in Malaysia, was assigned a double objective mission; to develop a new luminaire for this dual-purpose tunnel and to light the plaza tolls and the ingress and egress sections, connecting the tunnel to the city's already existing road network.



SMART Tunnel

The SMART tunnel is 9.7km long with an 11.83m internal diameter. The central 3km long section of this storm water tunnel also serves as a motorway tunnel when the floor diversion is not in operation.

The tunnel operates in 3 modes:

- No storms. If the peak flow of the holding pond of the Klang River is less than 70m³/s, no water is diverted into the tunnel.
- Moderate storms. If the peak flow rises to between 70 and 150m³/s, water in the holding pond will be diverted into the tunnel and pass beneath the lower level so that the traffic is not affected.

- Major storms. When the peak flow exceeds 150m³/s, the Motorway Control Centre advised that either one or both traffic levels need to be used for flood flow. Traffic is stopped from entering the tunnel and any vehicles in the tunnel are evacuated. The road decks will then open to water flow. The motorway re-opens to traffic within 48 hours after the closure.



The SMART luminaire provides an extensive, photometric distribution in both the lateral and transversal planes to optimise the spacing between the luminaires to 8m while giving excellent uniformity and remarkable visual comfort.



The LV3 is ideal for this low mounting height tunnel.



The Onyx 33 lights the toll plaza leading to the SMART tunnel. The curved glass protector provides a maximum flux control and reduces light pollution to a minimum.

Ingress and Egress Connections

The ingress and egress connecting tunnels required a compact luminaire with a high-performance photometry. Thanks to its very shallow profile (160mm), the LV3 is mainly used where space is restricted and was consequently ideal for these tunnels. More than 1,600 luminaires equipped with two 49W fluorescent lamps diffuse a white light to safely guide users and ensure visual comfort (4000K). High-pressure sodium lamps were fitted for the boost lighting.

Toll Plaza

More than 420 Onyx 33 luminaires fitted with 400W high-pressure sodium lamps light the motorways leading to the entrances of the SMART tunnel. Part of the motorway runs alongside a military air base. A cost-efficient and glare-free lighting solution was needed. The Onyx 33 is a robust luminaire, made entirely of aluminium and a toughened glass protector for optimum transparency. The curved shape of the protector enables a lower lamp position and so a more extensive photometric distribution which allows a more cost-effective spacing between columns. The qualities of the glass combined with the Sealsafe IP 66 advantages ensure that the Onyx 33 gives a consistently optimum level of photometric performance over the long term with no glare.

Source: Courtesy of Schreder Group.



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Model: EP-240
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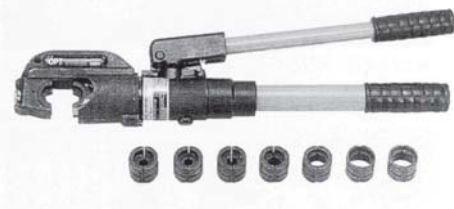


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Model: EC-52
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Model: TP-400
Crimping Connectors up to 400mm²
Fiberglass Handles



Model: S-100H
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Armoured Copper/Aluminium Cable

Pneumatic Crimping Tools



Model: PA6B & PF-1
Pneumatic Crimping Head
with Foot Air Valve

Hand Operated Tools



Model: LK-300B
Ratcheting Cable up to 325mm²



Model: LY-03B
For Insulated Receptacles & Tab



Model: KH-95WF
For Wire Ferrules, End Sleeves



Model: LK-500
Hand Cable Cutter



Model: LK-760L
Ratchet Cable Cutter



Model: KH-120
Hand Crimping Tool

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SMART Luminaire

An interview with Mr Yap Ching Kiat, Technical Adviser of Straits Design Sdn Bhd on their success in developing SMART Luminaire.

Q: What is Straits Design's role in the development of the SMART luminaire?

A: When we first received the luminaire specifications, we made some preliminary studies which lead us to the following conclusions:

- (a) luminaire has to be spherical in shape so that the thickness of material use in the construction can be reduced, and
- (b) as small as possible to reduce the drag coefficient and to reduce the length of matching surface to reduce leaking points.

We therefore have to consider other light sources other than the usual linear fluorescent lamp and High Pressure Sodium lamp widely used to light up tunnels.

At the same time, we have to meet the following photometric requirements:

Lighting requirement (road surface):

- (1) Night-time luminance : at least equal to the level of the access road ($L_{ave} \geq 3 \text{ cd/m}^2$)
- (2) Day time luminance : $L_{ave, road} \geq 6.12 \text{ cd/m}^2$ (first 500m)
 $\geq 2.08 \text{ cd/m}^2$ (remaining length)
- (3) Overall Uniformity : $U_o \geq 40\%$
- (4) Longitudinal Uniformity : $U_L \geq 70\%$
- (5) Threshold increment : $TI \geq 15\%$

Lighting requirement (tunnel wall up to 2m height):

- (6) a) Wall luminance : $L_{ave, wall} \geq 60\%$ of $L_{ave, road}$
- b) Overall uniformity : $U_o \geq 40\%$
- (7) Luminance spacing to avoid flicker effect:
 spacing $\leq 1.5\text{m}$ or spacing $\geq 4.2\text{m}$

In addition, the low mounting height 2.8m and wide carriage width of 8.85m means tilting angle of the luminaire has to be increased and glare control becomes a challenge.

Finally, it is only sensible that the number of leaking points be kept to the minimum and that means reducing the number of luminaire to the minimum possible.

Having taken all these factors into consideration, we conclude the ceramic metal halide lamp in our trade-marked micro reflector is the most suitable light source for application in this unique tunnel. This is also the first time that ceramic metal halide lamp is used for tunnel lighting.

Based on all these facts, our regional R&D Centre in China developed the concept and design the prototype and all the tests on the prototype were carried out in laboratories in Belgium.

The tools for the manufacture of the luminaire and the production of the luminaire are all done in Malaysia including the pressure test chamber that was needed to carry out 100% leak test on luminaire manufactured.

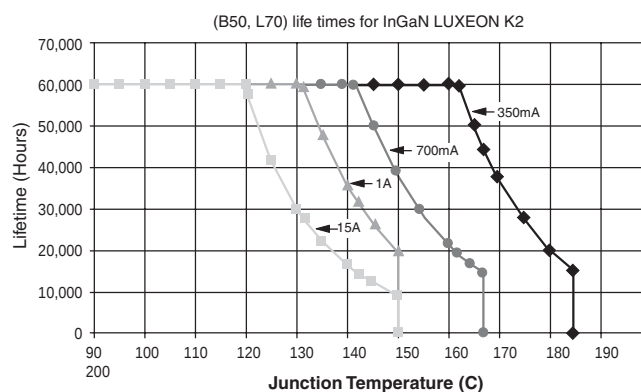
Q: What other light sources were considered and why did you finally decide on the ceramic metal halide lamp?

A: When we talk about small size, the first light source that come to mind is LED. Contrary to what is aggressively marketed, currently the efficacy of LED is about 55 lumen/watt and the rest of the power is converted to heat. In layman language, only 25% of power is converted to light and the other 75% to heat (based on the theoretical possibility of getting 200 lumen per watt). LED is also aggressively marketed for its long life of 50,000 hours or more.

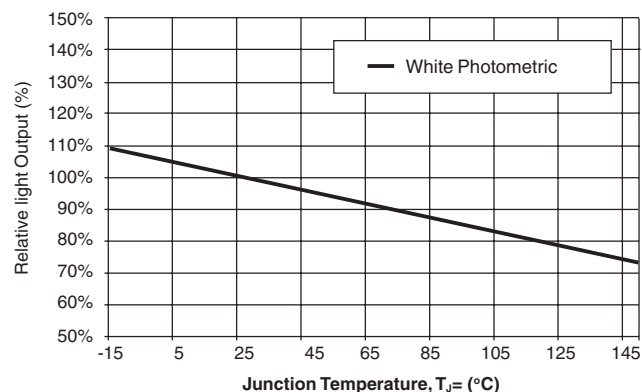
This is only true if the heat generated is effectively removed. Taking all this into consideration, LED is not the small light source that seems to be for this application.

We also took note that LED is in its fastest development stage now and there will be no replacement parts 2 ~ 3 years down the line which is a huge disadvantage for the operator for big project like this.

The following diagrams show the temperature vs life and temperature vs light output:



Cool White, Neutral-White and warm-white at Test Current



The other likely light sources are Compact fluorescent up to 18W, Induction lamp and Ceramic metal halide with G-12 base. The table below tabulates the comparison.

Descriptions	18W Compact fluorescent	85W Induction lamp	70W Ceramic metal halide lamp
Spacing	1.3 m	5.5 m	8 m
Quantity of fitting	9,200 nos	2,200 nos	1,500 nos
Temperature effect at Ta = 40°C	Light output reduce to 88% (see Figure 1)	Light output reduce to 60% (see Figure 2)	No noticeable influence.
Additional fitting (taking into account the temperature effect)	1,700 nos	1,500 nos (no additional fitting with 165W)	-
Lifespan (10% failures)	8,000 hrs (on conventional gear)	60,000 hours at Tcase of 65°C (but every increase of Tcase of 10°C will halve the lifetime)	12,000 hrs
Power required (including loss)	261.6 kW	314.5 kW (for 85W) 363.0 kW (for 165W)	129 kW



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The table above gives the factors in the order of priority to arrive at our decision.

The following figures show the temperature influence on the light output of fluorescent and induction lamp.

Figure 1. Fluorescent lamp – Effects of ambient temperature on relative luminous flux

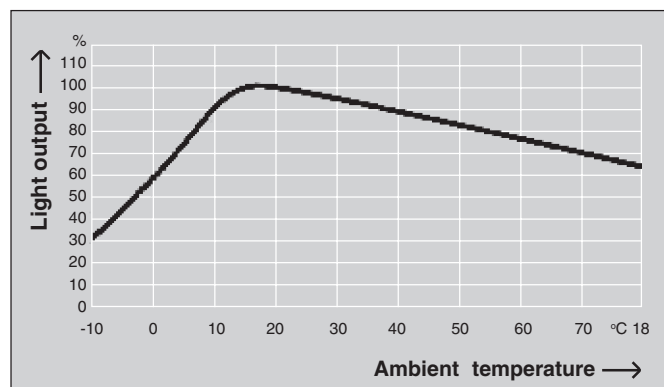
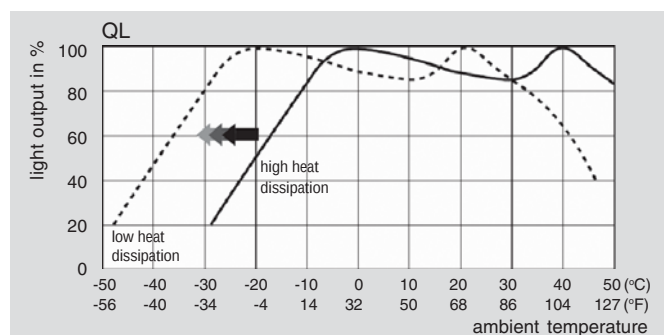


Figure 2. Induction lamp - Effects of ambient temperature on relative luminous flux



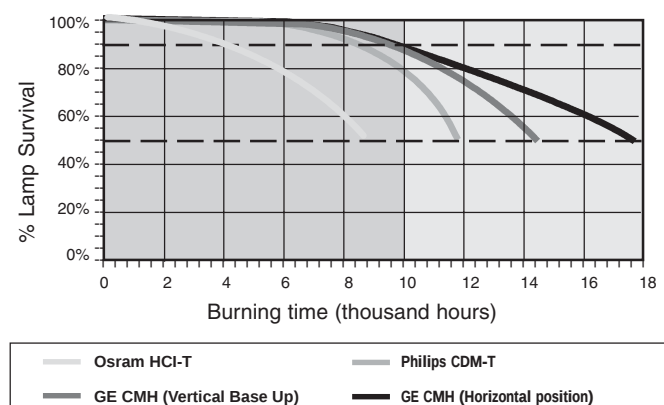
Q: Is there any difference between the different make of ceramic metal halide lamps?

A: The base and physical dimensions of the 3 major brands in the market are similar and can interchange with each other. However, there are major difference in the lumen depreciation and mortality rate based on their published datas as shown below.

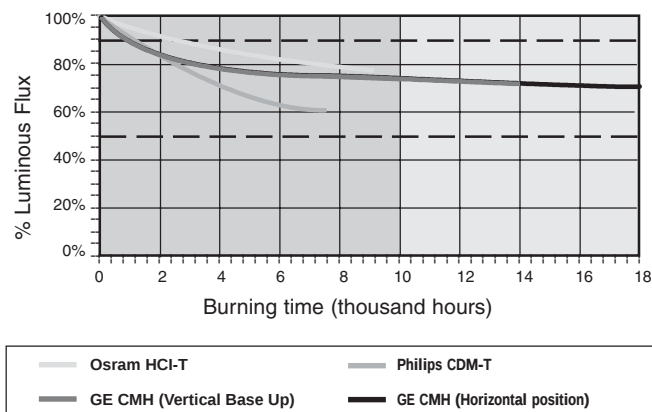
All three makes will meet the photometric requirement, when used in our micro reflector for this type of lamp. However, the main contractor also paid a lot of attention to operation and maintenance cost and these two characteristics become very important in our decision.

Based on our extensive experience with HID lamps and that the lamps will be operated 24/7, we have given a written guarantee that the lamp failure rate will not be more than 10% up to 16,000 operating hours, an extension to what lamp manufacturers are not even prepared to commit. The lamps have been in operation for 13,000 hours now and less than 5 has burn out which only goes to show that experience counts.

- Lamp survival:



- Lumen maintenance:



Q: Besides the challenges in the design and development, what are the challenges you face locally in the manufacture and supply of the SMART luminaire?

A: Although the design of the main luminaire casting looks simple, it is actually a complicated piece with big difference in thickness within the casting and we have to make many changes in the tool to achieve the desired quality of casting and reasonable productivity. This took a lot of time which causes a lot of panic to the project team although we assured them that there was still plenty of time. Anyway the panic was good so that the project can be completed earlier than planned.

Meanwhile, the original intention to deliver the luminaires fully wired including the power supply cable had to be abandoned as the IP68 connector available in the market were not designed to withstand the 25m submersion. The whole installation methodology had to be changed and this calls for some modification to the luminaire so that we can do termination at site. We are now required to design test methods to be carried out on the luminaire that is literally put together on site rather than in the factory.

We also have the additional problem of coordinating with the electrical sub-contractor of the project. This proves to be the most challenging in the whole process given the level of skill, knowledge, power of understanding, planning, management ability and attitude of the sub-sub contractors.

Q: Finally, do you consider this project a success?

A: Yes, despite the challenges, we have more than met the photometric specifications, and passed the wet test, not for 24 hours as specified but more than 36 hours submersion, not with the lights off as specified but switched on during the test, because everybody were curious to know how the flooding of the tunnel looks like. Contractually, by not switching off the lights during flooding actually voids our warranty on the luminaire, but then the main contractor knows that Straits Design is not so unaccommodating.

Mr Yap Ching Kiat graduated from University of Malaya with a degree in Mechanical Engineering. Upon graduation he worked for three and half years in the Power Station before joining the private sector to set up a factory to manufacture automobile air-conditioner parts before becoming the Technical Adviser to Straits Design Sdn Bhd since 1990. During this period, he works with the various department of Schreder Group of Companies beginning with Application Studies, Production, Manufacturing and R&D to continuous develop new luminaires to meet new lighting standards in the most energy efficient way.



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Power Quality

The present power quality environment in Malaysia

One of the main driving forces that helps to accelerate industrialisation process in a country like Malaysia is direct foreign investment in manufacturing. In the majority of cases, the manufacturers are establishing or refurbishing plants with high-tech equipment for increased productivity that requires high quality power. Therefore, one particular luring attribute is the ability of the country's power utility to provide the power quality requirement demanded by these customers. With the increased use of power electronics in the industrial and commercial sectors, new power quality problems such as harmonics have emerged which have to be addressed by power utilities worldwide.

Power quality has now become an important component of service reliability to both utility and customers. The power quality problem has now become more critical due to industrial equipment becoming more sensitive to minor voltage variations.

Equipment has become more sensitive to voltage disturbances

In Malaysia, electronic equipment has become much more sensitive than their predecessors 10 or 30 years ago. Not only has equipment become more sensitive, companies have also become more intolerant to loss of production time due to their reduced profit margins and competitiveness.

The sensitivity of small ac induction motors to voltage sags is found to be very much dependent on the performance of the contactors used in the control circuitry. In the majority of cases, the sensitivity of the contactors could be adjusted to override most of the voltage sags.

Large ac induction motors are normally connected through circuit breakers with under-voltage relays. On many occasions, the under-voltage relays (UVR) were found to trip instantaneously. Direct Current (DC) motors with variable speed drive (VSD) or adjustable speed drives (ASD) are commonly provided with under-voltage relays that are easily affected by voltage sags. The drive controller unit has also been found to be sensitive to voltage sags resulting in maloperation. In many cases, motors equipped with ASDs also generate harmonics into the installation compounding the power quality problems.

Voltage disturbances generated by customers' equipment

Most of the power quality problems experienced by the customers in Malaysia are voltage sags. Voltage sags that occurred are due to short-circuits in the power delivery systems and faults from customers' internal installations.

There are widespread beliefs among utility customers that voltage sags are problems that only originate from the utility systems. The utility has many instances experienced cases of short-circuits in the customers' installations including internal transformer faults, cable failures and motor starting phenomena that resulted in the malfunction of sensitive equipment of other customers connected to the same source of supply.

There are also proven cases where the sources of the power quality disturbances were linked to the end-user equipment. Modern electronic equipment is not only sensitive to voltage disturbances but could also be the source of the voltage disturbance itself. The increased use of converter-driven equipment (from consumer electronics and computers, to adjustable speed drives) has led to a large growth in the number of voltage disturbances. The main issue here is the non-sinusoidal current drawn by rectifiers and inverters. The input current

not only contain a power frequency component but also the so-called harmonic components with frequencies equal to multiples of the fundamental power frequency of 50 Hz.

The harmonic distortion of the current leads to the existence of harmonic components in the supply voltage. Equipment has produced harmonic distortion for a number of decades. However, harmonic distortion issues became serious due to substantial growth of load fed via power electronic devices in the last 20 years or so. The cumulative impact of such equipment could cause a serious distortion of the supply voltage.

Steady-State Supply Voltage Performance

Before more details are presented on the definition of electromagnetic disturbances, it is good that we first understand the definition of voltage regulation. Most customers and consultants often dispute the definition of voltage regulation and electromagnetic disturbances.

The term "voltage regulation" is used to discuss long-term variations in voltage. It does not include short-term variations, which are generally called voltage sags or voltage swells.

The ability of equipment to handle steady state voltage variations varies from equipment to equipment. The steady state voltage variation limits for equipment is usually part of the equipment specifications. The Information Technology Industry Council (ITIC) specifies equipment withstand recommendations for IT equipment according to the ITI Curve (formerly the CBEMA curve). The 1996 ITI Curve specifies that equipment should be able to withstand voltage variations within $\pm 10\%$ of nominal voltage (variations that last longer than 10 seconds).

In Malaysia, the voltage regulation requirements are defined in two categories:

- Range A is for normal conditions and the required regulation is as follows:

Table 1: Steady-state voltage level fluctuation limits under normal conditions

Nominal Voltage	% Variation of nominal voltage
400V and 230V	-6% and +10%
6.6kV, 11kV, 22kV, 33kV	$\pm 5\%$
132kV and 275kV	-5% and +10%

* Note : The new low voltage regulation limits are based on the new MS IEC 60038:2006

- Range B is for short durations or unusual conditions. Under contingency condition, when one or more circuit elements are on outage, the power frequency steady-state voltage at all points in the utility's distribution system including the points before the consumer metering must be planned to be maintained as follows:

Table 2: Steady-state voltage fluctuation limits under contingency condition

Nominal Voltage	% Variation of nominal voltage
400V and 230V	$\pm 10\%$
6.6kV, 11kV, 22kV, 33kV	$\pm 10\%$
132kV and 275kV	$\pm 10\%$

Understanding Power Quality and EMC

Definition of Power Quality

Power quality is a term used to discuss events in electric power grids that can damage or disrupt sensitive electronic devices. There are many ways in which a power feed can be poor in quality, and so no single figure can completely quantify the quality of a power feed.

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Power quality is actually a compatibility problem, or to be exact electromagnetic compatibility (EMC) problem. Is the equipment connected to the power grid, compatible with the events on the grid, and is the power delivered by the grid, including the events, compatible with the equipment that is connected? Compatibility problems always have at least two solutions: in this case, either clean up the power, or make the equipment tougher.

Ideally electric power would be supplied as a sine wave with the amplitude and frequency given by national standards (in the case of mains) or system specifications (in the case of a power feed not directly attached to the mains) with an impedance of zero ohms at all frequencies.

However, no real life power feed will ever meet this ideal condition. It can deviate in the following ways (among others):

- Variations in the peak or rms voltage (both these figures are important to different types of equipment). When the rms voltage exceeds the nominal voltage by a certain margin, the event is called a “swell”. A “dip” (in UK English) or a “sag” (in American English - the two terms are equivalent) is the opposite situation: the rms voltage is below the nominal voltage by a certain margin.
- An “undervoltage” or brownout occurs when the low voltage persists over a longer period of time
- Variations in the frequency
- Variations in the wave shape – usually described as harmonics
- Quick and repetitive variations in the rms voltage. This produces flicker in lighting equipment.
- Abrupt, very brief increases in voltage, called “spikes”, “impulses”, or “surges”, generally caused by large inductive loads being turned off, or more severely by lightning.
- Non zero low-frequency impedance (when a load draws more power, the voltage drops)
- Non zero high-frequency impedance (when a load demands a large amount of current, then stops demanding it suddenly, there will be a dip or spike in the voltage due to the inductances in the power supply line).

Understanding Electromagnetic Compatibility (EMC)

Electromagnetic Compatibility (EMC) is the branch of electrical sciences which studies the unintentional generation, propagation and reception of electromagnetic energy with reference to the unwanted effects that such an energy may induce. To this purpose, the goal of EMC is the correct operation, in the same electromagnetic environment, of different equipment which involve electromagnetic phenomena in their operation.

In order to achieve such an objective, EMC pursues two different issues:

- emission issues, in particular, are related to the reduction of unintentional generation of electromagnetic energy and/or to the countermeasures which should be taken in order to avoid the propagation of such an energy towards the external environment,
- and susceptibility or immunity issues, which refer to the correct operation of electrical equipment in the presence of electromagnetic disturbances.

Noise mitigation and hence electromagnetic compatibility is achieved by addressing both emission and susceptibility issues, ie, quieting the sources of interference, making the disturbance propagation path less efficient, and making the potential victim’s installation less vulnerable.

When the propagation of electromagnetic disturbances in guiding structures, ie conductors, transmission lines, wires, cables, printed circuit board (PCB) traces, is by a guided propagation mechanism,

conducted emission and susceptibility issues are considered, whereas, when open-space propagation of electromagnetic disturbances is addressed, the points of focus become radiated emission and susceptibility phenomena.

Understanding Electromagnetic Disturbances

Electromagnetic disturbance is an electromagnetic event, which may degrade the performance of a device, equipment or system, or adversely affect living or inert matter. An electromagnetic disturbance may be an electromagnetic noise, an unwanted signal or an immediate change in the propagation medium.

Common Power System Electromagnetic Phenomena

The IEEE 1159:1995 contains several additional terms related to the IEC terminology. The term voltage sag is used synonymously with the IEC term, voltage dip. The category of short duration variation is used to refer to the voltage dips and short interruptions as defined by the IEC standards.

The category of waveform distortion is used as a container category for the IEC harmonics, inter harmonics and dc in ac networks phenomena as well as an additional event from IEEE 519 called notching. Table 3 describes the IEEE categorisation of electromagnetic phenomena used for the power quality community.

Table 3: Categories and typical characteristics of power system electromagnetic phenomena defined in IEEE 1159:1995

Item	Category	Typical voltage Typical duration unit	magnitude in per
1.0	Transients		
1.1	Impulsive	<50ns	
1.1.1	Nanosecond	50ns-1ms	
1.1.2	Microsecond	<1ms	
1.1.3	Millisecond	>1ms	
1.2	0 scillatory		
1.2.1	Low frequency	0.3-50ms	0-4 pu
1.2.2	Medium frequency	20 ps	0-8 pu
1.2.3	High frequency	5 ms	0-4 pu
2.0	Short duration variations		
2.1	Instantaneous		
2.1.1	Interruption	0.5 - 30 cycles	< 0.1 pu
2.1.2	Sag(dip)	0.5 - 30 cycles	0.1-0.9 pu
2.1.3	Swell	0.5 - 30 cycles	1.1-1.8 pu
2.2	Momentary		
2.2.1	Interruption	30 cycles-3s	<0.1 pu
2.2.2	Sag (Dip)	30 cycles-3s	0.1 -0.9 pu
2.2.3	Swell	30 cydes-3s	1.1 -1.4 pu
2.3	Temporary		
2.3.1	Interruption	3s- 1min	<0.1 pu
2.3.2	Sag (Dip)	3s- 1min	0.1 -0.9 pu
2.3.3	Swell	3s- 1min	1.1 -1.2 pu
3.0	Long duration variations		
3.1	Interruption sustained	> 1 min	<0.1 pu
3.2	Under voltages	> 1 min	0.1-0.9 pu
3.3	Over voltages	> 1 min	1.1 -1.2 pu
4.0	Voltage imbalance	Steady state	0.5 -2
5.0	Waveform distortion		
5.1	dc offset	Steady state	0-0.1%
5.2	Harmonics	Steady state	0-20%
5.3	I nter harmonics	Steady state	0-2%

Overcoming Electromagnetic Compatibility (EMC) Issues

EMC is a characteristic of equipment or systems that mutually withstand their respective electromagnetic emissions. Equipment and systems are always subject to electromagnetic disturbances, and any electro-technical equipment is, itself, more or less an electromagnetic disturbance generator.

According to the IEC 61000-2-1, EMC is the ability of a device or system to function satisfactorily in its electromagnetic environment



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without introducing intolerable electromagnetic disturbances to anything in that environment.

For all electro-technical equipment, EMC must be considered right from the initial design phase and the various principles and rules carried on through to manufacture and installation. This means that all those involved, from the engineers and architects that design a building to the technicians that wire the electrical cabinets, including the specialists that design the various building networks and the crews that install them, must be concerned with EMC - a discipline aimed at achieving the "peaceful" co-existence of equipment sensitive to electromagnetic disturbances (which may therefore be considered as the "victim") alongside equipment emitting such disturbances (in other words, the "source" of the disturbances).

EMC is now becoming a discipline aimed at improving the co-existence of equipment or systems, which may emit electromagnetic disturbance and/or be sensitive to them.

Common Solutions to Electromagnetic Disturbances

The common acceptable solutions for power quality problems frequently involve some combination of wiring and grounding upgrades and the use of mitigation equipment. In some cases, it may be more cost effective for the customer to purchase and install mitigation equipment than to re-wire all or part of a facility. This is particularly true when the facility includes numerous additions or has undergone many remodeling.

Understanding grounding solution

The primary purpose of grounding electrical systems is to protect personnel and property if a fault (short circuit) were to occur. A second purpose of a grounding system is to provide a controlled, low impedance path for lightning-induced currents to flow to earth harmlessly.

All metal objects that enclose electrical conductors, or are likely to become energised in the event of a fault or electrostatic discharge, must be effectively grounded to provide personnel safety as well as equipment performance. It is best to use solidly grounded AC supply systems.

Grounding is an extremely important electrical consideration for the proper operation of electronic equipment. The ground conductor provides a designated path to ground (earth). A properly designed grounding system should have as low an impedance as is practically achievable for proper operation of electronic devices as well as for safety.

Electronic equipment can be sensitive to stray currents and electronic noise. It is important to utilise a continuous, dedicated ground for the entire power system so as to avoid a ground differential between various grounds being used. The connection to earth or the electrode system, needs to have sufficiently low resistance to help permit prompt operation of the circuit protective devices in the event of a ground fault, to provide the required safety from shock to personnel, and protect the equipment from voltage gradients that may damage the equipment.

Understanding isolated ground

Isolated grounding is a loosely defined technique that attempts to reduce the chances of electrical noise entering the sensitive equipment through the equipment grounding conductor. The exact methods used in isolated ground wiring vary somewhat from case to case, and there is no defined standard method.

In a typical branch circuit, the grounding conductor of the equipment is connected to the metallic outlet box through the connection of the grounding conductor screw to the mounting strap, as well as to the green grounding conductor for that circuit. It is then further connected to the metallic panel board enclosure where the branch circuit

originated. There, it can pick up noise from adjacent circuits sharing the panel board.

Usage of multiple rods with a ground ring is advisable to ensure low resistance to ground (1 ohm or less is desirable, even less for certain sensitive applications, such as telecommunications facilities).

Understanding wiring solutions: Separation of sensitive electronic loads from other equipment

A dedicated "computer" circuit in each office is a good idea, at least back to the branch circuit panel. A better idea, and required in some cases, is to power sensitive equipment from separate branch circuits emanating from separate panel boards, fed from separate feeders back to the main service entrance.

The neutrals and grounding conductors need to be kept separate also. A dedicated circuit means separate phase wires, a separate neutral, with a separate grounding conductor, run in its own separate metal conduit, back to the source.

Avoid having sensitive equipment on the same circuits, or even panel boards, as motor loads. Such equipment as laser printers, copying machines and fax machines should be kept separate from computers.

For better understanding on wiring and grounding solutions, the IEC standards to be referred are:

IEC document	Description
IEC 60364-1	Electrical installations of buildings - Part 1: Scope, object and fundamental principles
IEC 60364-4-41	Electrical installations of buildings - Part 4-41: Protection for safety - Protection against electric shock
IEC 60364-4-43	Electrical installations of buildings - Part 4-43: Protection for safety - Protection against overcurrent.
IEC 60364-4-44	Electrical installations of buildings - Part 4-44: Protection for safety - Protection against electromagnetic and voltage disturbances.
IEC 60364-5-53	Electrical installations of buildings - Part 5-53: Selection & erection of electrical equipment - Isolation, switching and control.
IEC 60364-5-54	Electrical installations of buildings - Part 5-54: Selection & erection of electrical equipment- Earthing arrangement

General power quality improvement equipment for customers

There is a variety of mitigating equipment available for improving the quality of electric power for the sensitive loads. They range from those that are inexpensive and provide little protection to those that protect against almost all eventualities at a much higher price. The typical power disturbances and types of protection equipment advisable to be used for customers' installations are shown in Table 7.





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SIEF 2008 will serve the Korean electrical and electronic industry. TEEAM intends to organise a trade delegation to visit the exhibition. Members who are interested may contact the TEEAM Secretariat for details.

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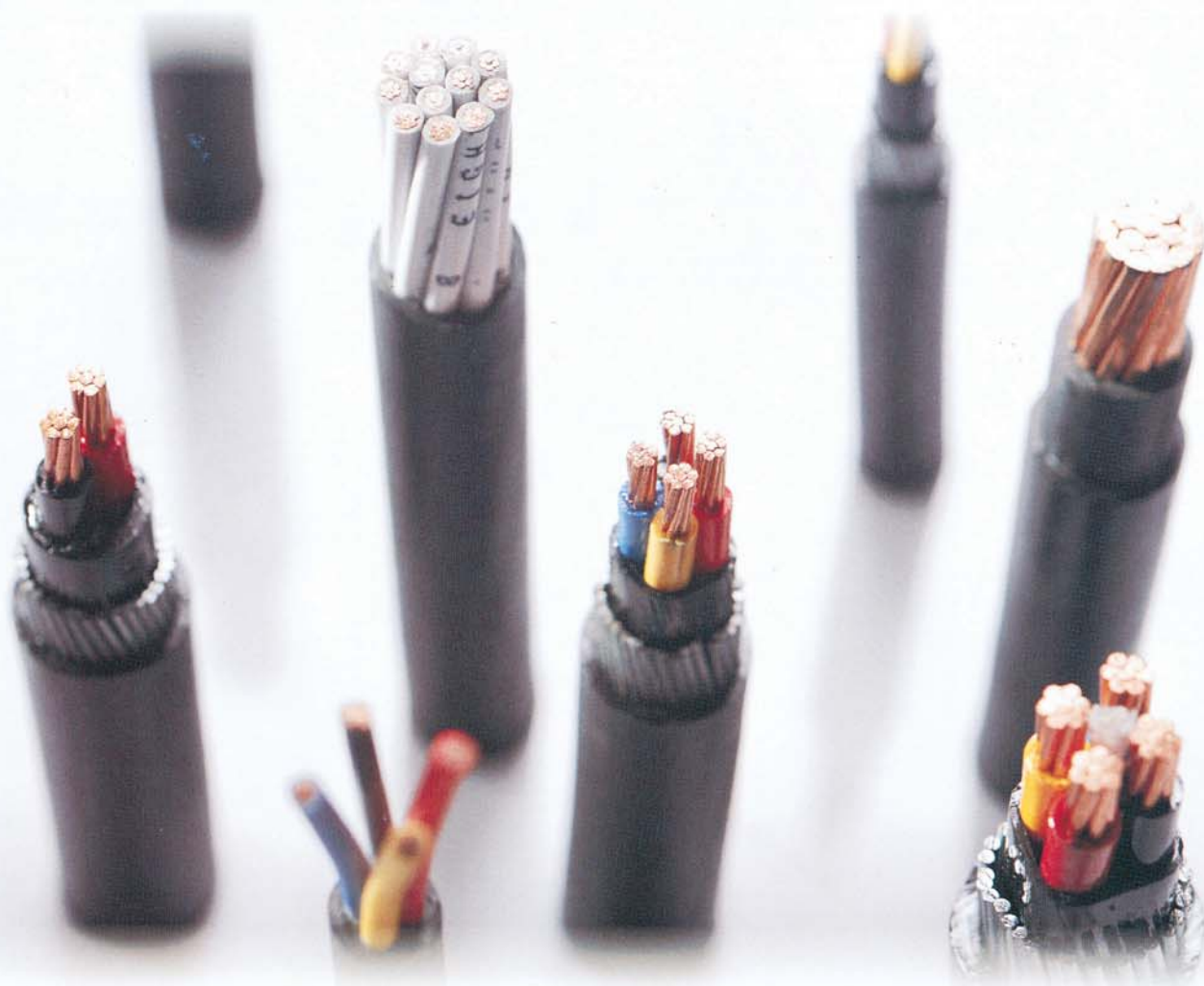
Table 7: Typical Power Disturbances and General Protection Equipment for Customer

Type of disturbances	Impact	Protection Equipment	Type of disturbances	Impact	Protection Equipment
Voltage sag is a momentary decrease in voltage outside the normal tolerance. Voltage sags are caused by external disturbances to the power supply networks and internal faults in customers' premises.	Incorrect operation of power-down sensing circuitry in computers and controls.	Install power conditioner at the control circuit (Secondary Equipment AC or DC): • Dip Proofing Inverter (DPI) • Voltage Dip Compensator (VD.C) • Constant Voltage Transformer (CVT) • Dynamic Sag Corrector (DySC) • Dynamic Compensator (Dynacom) • Etc Install low voltage 3-phase power conditioners at the incoming feeders of the sensitive areas: • Dynamic Sag Corrector (DySC) • Dynamic Compensator (Dynacom) • Active Volt Conditioner (AVC) • Flywheel • Etc Install medium voltage 3-phase power conditioners at the incoming of the plants: • Dynamic Voltage Restorer (DVR) • Etc	Noise can be caused by poor contacts in wiring and switchgear, improper grounding and radio equipment.		
Voltage swell is a momentary increase in voltage outside normal tolerance. Swells are caused by sudden decrease or turn-off of heavy loads.	Damage to equipment by breaking down insulation.	Voltage regulators, motor-generator set, Flywheel, LV DVR, UPS, etc.	Impulses (also known as spikes and surges) are short duration voltage increase. Impulses are caused by lightning, power system faults and switching of heavy loads.	Damage to electronic equipment. Insulation breakdown in transformer and motor loads.	Transient Voltage Surge Suppressors (TVSS), Surge Protective Device (SPD), etc.
Electrical noise is a distortion of normal sine wave power.	Incorrect operation of microprocessor-based equipment	Isolation transformer, etc.	Harmonic distortion is a periodic deviation from the true sine wave and it may be caused by arc furnaces, gas discharge lighting, power converters etc.	Over heating of motor loads, incorrect operation of relays and insulation breakdown.	Harmonic Filter, etc.
			Under voltage or over voltage are conditions of abnormally high or low voltage persisting for more than a few seconds. They are caused by poor voltage regulation, circuit overloads etc.	Damage and shutdown of equipment depending on their tolerance to abnormal voltage.	Voltage regulator, motor generator set or UPS.

Source: Power Quality Guidebook published by Tenaga Nasional Berhad.



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- Up to IP 65 protection
- Class II total insulation
- Full Type Tested



THESE PRODUCTS SUPPLEMENT AN EXTENSIVE RANGE OF CIRCUIT PROTECTION DEVICES AND INDUSTRIAL PLUGS & SOCKETS



Pentapower

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