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RCCB – The Safety Device to Save Your Life When A Current Leakage Occurs

Contributed by Mr Wong Seak Wai of Persatuan Penjaga Jentera & Pendawai Elektrik Perak –PKPPE
(The Perak Electrical Chargeman & Wireman Competence Association)

A) Introduction

Electricity is an essential part of our daily lives. It provides energy for water heating, cooling, cooking, refrigeration, lighting and to all of our modern appliances. If electricity is installed by experts and is used wisely, it is a safe and economical energy source. Unfortunately, every year people are accidentally killed or injured by electrical shocks because they were not aware of the inherent dangers, or they did not use electricity in a safe manner.

Nowadays, accidental electrocution cases in residential places are more frequently being heard of and reported in newspapers in Malaysia. This brings shocking awareness and worries to the general public. In such dire situations, Residual Current Circuit Breakers (RCCBs) act as one of the protection devices to automatically cut off the power supply whenever any current leakages occur for the TT (Terra-Terra) System in our country.

The Energy Commission (Suruhanjaya Tenaga) had already come out with regulations stating that RCCBs with different sensitivities should be used in different locations, equipment and situations. An RCCB Guideline was also published by the Energy Commission to provide references to correctly implement RCCBs in our residential buildings for single and three-phase electricity supplies.

B) Energy Commission Electrical Safety Performance Report 2015

From the Electrical Safety Performance Report 2015 of the Energy Commission, it is noted that some of the accident cases were recorded as installation/maintenance defects, RCCB malfunctions and RCCBs with wrong sensitivities.

No.	Date	Location	Summary	Reason
1	28-4-2015	Residential	Civilians killed by electrocution during repair of spotlight on the roof itself.	Installation/Maintenance defect.
2	11-6-2015	Residential	One man was killed and three others injured due to electrocution when using the instant water heater. Leakage current was caused by damaged ballast fluorescent lamps.	Defects in equipment electricity supply. No RCCB with 10mA sensitivity was installed and the RCCB 40/0. 1A malfunctioned at the Main Distribution Board.
3	29-11-2015	Residential	A boy was killed by 'electric shock' when handling the grill door, due to leakage currents from the rice cooker, which caused the earth cable to be energized. There was leakage current flowing through the wall plug of the grill gate (railing frame grill type).	Installation/Maintenance defect.

List of Reported Accidents and Electric-Shock Cases, Investigated by the Energy Commission (Year 2015), Pages 71-82.

C) Electricity Regulations 1994

Regulation 36. Protection against earth leakage current.

- (1) For an installation in a place of public entertainment, protection against earth leakage current shall be afforded for any final circuit

supplying electricity to an equipment which is intended to provide service to the public or which is intended to be accessible to, used by or operated by the public by a residual current device having a rated residual operating current not exceeding **10 milliamperes (mA)**.

- (2) For an installation in a place where the floor is likely to be wet or where the wall or enclosure is of low electrical resistance, protection against earth leakage current shall be afforded for any final circuit supplying electricity to any equipment, either individually or in a group, by a residual current device having a rated residual operating current not exceeding **10mA**.
- (3) For an installation where hand-held equipment, apparatus or appliance is used or is likely to be used, protection against earth leakage current shall be afforded for any final circuit, either individually or in a group, by a residual current device having a rated residual operating current not exceeding **30mA**.
- (4) For an installation, other than the installations mentioned in sub-regulations (1), (2) and (3), protection against earth leakage current shall be afforded for any final circuit, either individually or in a group, by a residual current device having a rated residual operating current not exceeding **100mA** unless
 - (a) for functional reasons, it is impractical to provide the protection; or
 - (b) it is unsafe or even dangerous to provide the protection.

D) Guidelines for Electrical Wiring in Residential Buildings

The Guidelines for Electrical Wiring in Residential Buildings were issued by the Energy Commission based on the Electricity Supply Act 1990, The Electricity Regulations 1994, MS IEC 60364:2003 "Electrical Installations of Buildings", MS 1936:2016 "Electrical Installations of Buildings – Guide to MS IEC 60364", MS 1979:2015 "Electrical Installations of Buildings - Code of Practice".

The purposes for this Guideline are as follows:

- 1) Used as wiring guide for all Wiremen and Electrical Contractors for undertaking electrical wiring in residential buildings and conforming to the Electricity Regulations 1994.
- 2) Prepared in a concise and compact manner to facilitate the electrical wiring of residential buildings to be done adequately and to ensure its safety of use while meeting basic wiring requirements.



Electrical Wiring Guidelines for Residential Buildings
(1st Edition: 2008; 2nd Edition: 05-04-2015, 3rd Edition: 08-06-2016).



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..... Continue RCCB – The Safety Device to Save Your Life When A Current Leakage Occurs

- 3) For owners of residential buildings or wiring installations to recognise the requirements of safe and adequate electrical wiring.

Features of Electrical Wiring comprise electrical equipment such as cables, switch boards, main switches, Miniature Circuit Breakers (MCBs), RCCBs, lighting points, power points, lightning arrestors, etc. Some examples for single phase and three-phase consumer electrical wiring are shown in single line diagram as a guideline.

No.	Installation Type	Residual Current Device Sensitivity (Maximum)	Requirement
1.	Overall Wiring (Single Phase or Three Phase)	100mA (0.1A)	Mandatory
2.	Final Circuit for Power (13A socket outlets)	30mA (0.03A)	Mandatory
3.	Wet places (toilets and wet kitchens) / Water heater circuits	10mA (0.01A)	Mandatory

Requirements for the Use of Residual Current Devices - RCDs (Sensitivity) Based on Regulation 36, Electricity Regulations 1994.

E) MS 1979:2015

Malaysia Standard MS 1979:2015 – Electrical installations of buildings – Code of Practice (First revision) also stated:

4.8.6 COP 51, RCDs for single phase installations

RCDs for single phase installations shall have a rated residual operating current not exceeding 100mA.

4.8.7 COP 52, RCDs for three-phase installations

RCDs for three-phase installations shall have a rated residual operating current not exceeding 100mA. Provided there are no three-phase loads in the installation, it is recommended to install three (3) single phase RCDs instead of a single three-phase RCD. This practice will reduce the extent of power disruption in the installation in case there is an earth fault in one phase.

4.8.8 COP 53, RCDs for hand-held and fixed apparatus

RCDs with a rated residual operating current not exceeding 30mA shall be installed in installations where portable or fixed apparatus such as electric power tools, hair-dryers, electric kettles and washing machines, are used. RCDs with rated residual operating current not exceeding 30mA can be installed to protect an individual final power circuit or to protect a group of final power circuits.

4.8.9 COP 54, RCDs for special places

RCDs with a rated residual operating current not exceeding 10mA shall be installed in the following instances:

- Where the floor is likely to be wet such as in water fountains, bathrooms, kitchens and swimming pools;
- For the protection of equipment and apparatus, such as electric water heaters, booster pumps and other similar types; and
- (Recommended) Where supply apparatus is used by children, the elderly, uninformed consumers who are sick, or other similar categories.

4.8.10 COP 55, Location of RCDs in single RCD-protected installation

If an installation is protected by a single RCD, it shall be located at the origin of the installation, that is, immediately after the main incoming isolator at the consumer unit or main switchboard.

4.8.11 COP 56, Periodic testing of RCDs

An RCD should be tested at least every 6 months once to ensure its proper operation. The test shall be carried out in accordance to the Electricity Supply Act 1990 and the Electricity Regulations 1994, in accordance with the recommendations of the manufacturers and/or in line with good maintenance practices.

F) RCCB Tests

Therefore, an RCCB needs to be tested regularly to ensure that its functionality is workable and that it is also accurate.

1) RCCB Test Method 1

- Use the RCCB Trip “T” Button

- Press the “T” button on the front of the RCCB quickly and then release it. The button will only test the RCCB if an electricity supply is connected. Pressing the “T” button will simulate an earth leakage fault condition and indicate whether the device is operating correctly or not. The RCCB will trip and restore the “T” Button to its original position.

- If the RCCB does not trip, please contact an electrically competent person to investigate and identify the fault immediately.



2) RCCB Test Method 2

- Use Socket Tester

- By plugging in the Socket Tester at any of the 13A switch sockets. Faults are signalled by 3 LEDs on the front of the Socket Tester with a simple diagnosis chart for typical errors included on the label next to the LEDs.

- If a fault is detected, always investigate the wiring under test or have the wiring investigated by an electrically competent person.

- If no fault is detected, pressing the Press Button on the Socket Tester will simulate an earth leakage fault situation and indicate whether the device is operating correctly or not.



Earth Leakage Circuit Breaker (ELCB) & Socket Tester

3) RCCB Test Method 3

- Use RCD Tester

- By injecting a ½-rated leakage current at sine wave 00 and at 1800 (Should NOT Trip at all)
- By injecting a 1x-rated leakage current at sine wave 00 and at 1800 (Should trip at the time or period of not more than 200ms)
- By injecting a 2x-rated leakage current at sine wave 00 and 1800 (Should trip at the time or period of not more than 150ms)
- By injecting a 5x-rated leakage current at sine wave 00 and 1800 (Should trip at the time or period of not more than 40ms).



An RCD Tester

No.	Operating Switch Location	Execution Time	Result
1.	No Trip	> 200ms	Does not trip
2.	Trip	< 200ms	Trip
3.	Fast Trip	< 40ms	Trip

Maximum Operating Time of RCDs (in seconds) as stated in the Energy Commission Guidelines.

G) Conclusion

Electricity Regulations, Guidelines and SIRIM Standards have already clearly stated that the use of 10mA, 30mA and 100mA is mandatory by referring to the RCCB installation types.

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8th Malaysian Construction Summit

TEEAM participated as one of the supporting organisations for the 8th Malaysian Construction Summit 2017 which was organised by the Master Builders Association Malaysia (MBAM). It was held on 11th April 2017 at the Kuala Lumpur Convention Centre. Themed “Redefining Profit – Value Creation Through Quality and Safety”, the Summit was held in conjunction with the International Construction Week 2017 (ICW 2017) which in turn was organised by the Construction Industry Development Board of Malaysia (CIDB).

The theme was timely as construction industry players are constantly looking out for ways to enhance their quality, safety and professionalism through the adoption of modern technology and more efficient processes. YB Dato’ Sri Haji Fadillah Haji Yusof, Minister of Works, Malaysia officiated the summit opening. Interesting topics of presentation by the distinguished speakers included the following:

- * Redefining Profit: Value Creation through Safety,
- * Elevated Rail Track Construction on Top of Operational Shinkansen,
- * OSH Standards for PIPC/RAPID Project – Industrial Workforce Perspective,
- * Profitability and the Malaysian Construction Sector,
- * An Introduction to QCLASSIC,
- * HSE Transformation in SSP KVMRT Project, and
- * Occupational Safety & Health Standards for the Refinery & Petrochemical Integrated Development Project at the Pengerang Integrated Complex in Johor.

There was a highly interactive Question and Answer session between the participants, distinguished speakers and moderators. The summit was well attended by some 400 participants.



Summit in progress – Interactive panel discussion.



TEEAM extends support – Mr Suresh Kumar Gorasia (International Affairs Chairman & Past President, TEEAM) attended the summit.



..... Continue RCCB – The Safety Device to Save Your Life When A Current Leakage Occurs

According to the Electricity Regulations 1994 – Section 50E, A person who fails to comply with any code, guideline or orders the Commission issued under this Act, commits an offence and shall, on conviction, be fined not exceeding two hundred thousand ringgit Malaysia (RM200,000) or to an imprisonment for a term not exceeding two years, or both.

RCCBs have likely saved hundreds of lives and prevented thousands of serious injuries but they should not be taken for granted. There is the possibility that the RCCB may be damaged under common circumstances, including during power surges and lightning strikes. Therefore, it is critical to carry out periodical RCCB self-tests and to activate the RCCBs annually or even quarterly, to ensure that their vital protection is still there and that they are still working effectively. Awareness campaigns and education to the public, schools, organizations, companies, homes and workplaces should be constantly carried out by providing regular Trainings, Seminars and

Talks, “Test RCCBs Awareness” Media Campaigns and Road Shows - by sending print and video news releases to media all across the country.

Last but not least, all homeowners are strongly advised to always engage Energy Commission Registered Licensed Contractors to ensure the quality, cost-effectiveness, safety and reliability of their electrical installations whilst fulfilling legal requirements, international standards and local statutory requirements.

Mr Wong Seak Wai holds a Bachelor Degree in Electrical & Electronics Engineering from Universiti Malaysia Sabah. He was elected as Electrical Representative (2017-2018) of YES IEM (Perak). Mr Wong is the Honorary Secretary (2016-2018) and Member of the Technical Support Desk of Persatuan Penjaga Jentera & Pendawai Elektrik Perak –PKPPE (The Perak Electrical Chargeman & Wireman Competence Association).





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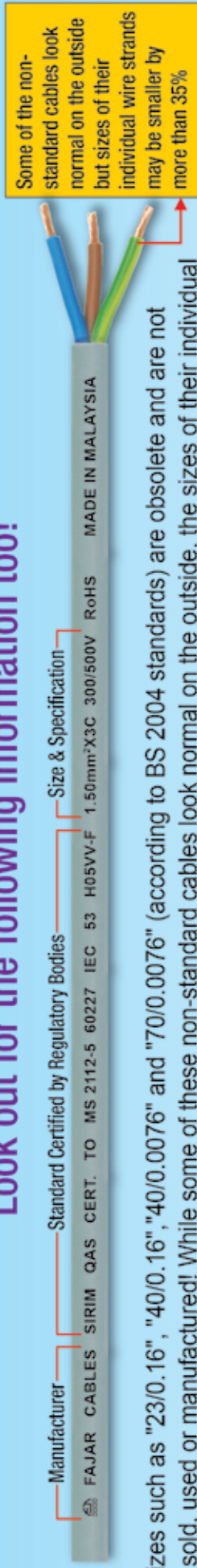
New Members

The following new members have been approved and accepted by the TEEAM Council (as at 16th March 2017). 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.

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There's more to electrical cables than just a label saying "100% Pure Copper Cable"

Look out for the following information too!



Cables with sizes such as "23/0.16", "40/0.16", "40/0.0076" and "70/0.0076" (according to BS 2004 standards) are obsolete and are not allowed to be sold, used or manufactured! While some of these non-standard cables look normal on the outside, the sizes of their individual wire strands may be smaller by more than 35%, resulting in poor electrical conductivity and dangerously high operating temperatures. For more tips and guidelines on how to tell a good cable from an inferior one, contact us at contact@fajarcables.com.my.



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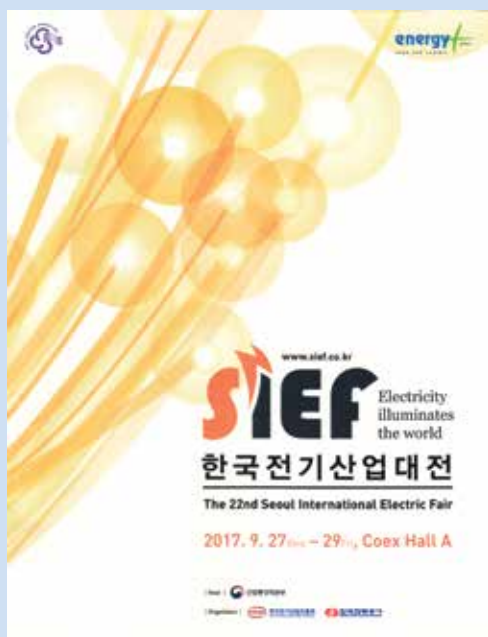
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SIEF Korea 2017

SIEF 2017 is the 22nd Seoul International Electric Fair on Electricity and Power Generation which will be held from 27th to 29th September 2017 at COEX Hall, Seoul, South Korea. The exhibition is co-organised by the Korea Electrical Manufacturers Association (KOEMA) and the Korea Electrical Power Corporation (KEPCO). It is expected to draw 220 exhibiting companies who will take up an estimated 450 booths, with some 30,000 visitors in attendance. There will be One-To-One Business Matching Meetings organised for visiting delegations.

Exhibits profile include – Transformers, Switchgears, Switchboards, Switches & Breakers, Wires, Sub-station Automation, Surge Protection Devices, Energy Management & Storage Technology, Test & Monitoring Equipment, Rotating Machines, Inverters, Lighting Equipment, Materials & Components, Renewable Energy Equipment and many others.

Four other co-located shows to be held during that period are: Power Generation Korea, Inter Battery, Korea Smart Grid Expo and International Climate Change Expo.

For TEEAM Members who are interested to participate as exhibitors and visitors, kindly contact the TEEAM Secretariat at teeam52@gmail.com. Visitors may enjoy some Buyers' incentives from the Organiser.

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General Safety Information on Smoke Detectors

Contributed by Mr Muhammad Izzuddin Abdul Latif of Hager Engineering (M) Sdn Bhd

The public nowadays are both more concerned and increasingly aware of safety issues. This might be a result of more frequent news coverage of injuries and tragedies that occur due to unfortunate hazards. Simultaneously, it is also due to the increasing role of our modern-day highly accessible news-sharing social media platforms. Reflecting on the latest trends from industry, more and more products are now emerging from industry to at least attempt to convert those unfortunate tragedies into 'avoidable ones'. An example of this is the application of smoke detectors.

Smoke detector, in a layman's perspective, is a product which is only used in commercial facilities and very limited in scope, or otherwise defined as being used in luxurious residential areas only. However, not many will realise that a smoke detector is also intended for protection of even the normal residential homes as well.

The standalone smoke detector will either work on its own, or in a group basis where it is inter-connected to other smoke detectors. Depending on the technology adopted, some can be inter-connected to up to 40 different units. This certainly improves the coverage of the detection range. Some can even be connected to alarm systems or the central monitoring system.

Smoke detectors can be powered by batteries alone or additionally, they work on live supply. The battery then would serve as a backup in case of blackouts or loss of power. This allows continuous and better protection for the owners.

The stipulated alarm level for warning is around 85 dB, or a level that would certainly indicate an emergency situation. The level of alarm would differ though, and it is usually lower during manual testing. Some detectors will include emergency lights as these would help to trigger and bring awareness to people such as those with lesser hearing capabilities.

Location-wise, a smoke detector is preferably installed in rooms subject to risks of fire (that is, living rooms with a fire place, children's rooms, etc.) It shall not be fixed in rooms that are very dusty, or where cooking and steam can cause false alarms to accidentally trigger. This only means that the specific location of the smoke detector must not allow for the possibility of it to easily capture these kinds of 'unintended' smoke sources. If it is installed in a kitchen, then a suitable distance for its placement must be considered too, that is, far from those smoke-generating appliances found thereat.

As for domestic usage purposes, smoke detectors with built-in testing features coupled with user-friendliness are much preferred. It is important to refer to the user instructions as different products may employ different methods. Ensure that you DO NOT forget to inform your neighbours or people who are nearby, before testing is carried out, as this may cause unintended chaos or panic from the surroundings, should they not be fore-warned. Additionally, to accommodate normal activities that may produce dust (e.g., when sweeping floors), some smoke detectors are able to be disabled manually on a temporary basis.

A user-friendly smoke detector would also provide additional value-added features, such as an LED indicator press button, which would help indicate its operating status. As an example, it can indicate when the battery is low so that the user would be able to replace it promptly. Another important point to note is that some maintenance work is



required to be undertaken to ensure that the smoke detector is always in good working condition. Some may require the detection head to be vacuum-cleaned at least once per year.

Important Smoke Detector Tips and Selection Guides:

1. Suitable audible alarm level for warning purposes (i.e., 85 dB).
2. Built-in emergency light alarm, to cater for those with lesser hearing capabilities and to illuminate the area should there be any power failure.
3. Back-up powered by battery, in case of blackouts and power loss.
4. Built-in testing system including LED light for indication status (e.g., for weak battery indication).
5. Ensure installation method is suitable for the intended location.
6. Possibility of interlink with other units in order to increase the coverage area or to provide input signal to alarm system.

Last but not least, upon installation of the preferred smoke detector, it is important to refer the Manufacturer's User Manual and afterwards, to be thoroughly familiarised with the product itself. Do not ever hesitate to contact the Manufacturer should you find any difficulties in understanding the product features and operating functions.

Muhammad Izzuddin Abdul Latif sees himself as an explorer in the world of engineering. He's passionate about the idea of simplicity, inspired by a famous remark made by Albert Einstein: "Everything should be made as simple as possible, but not simpler."

Graduated in Electronics & Electrical Engineering from University of Strathclyde (UK), he was with Sony as a Senior Engineer before joining the marketing team in Hager Engineering (M) Sdn Bhd. He can be contacted at izzuddin.latif@hager.my



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The Risk of Explosion of Electric Storage Water Heaters in Malaysia

Contributed By Mr Choo Wei Seng of ShowerTec Industries Sdn Bhd

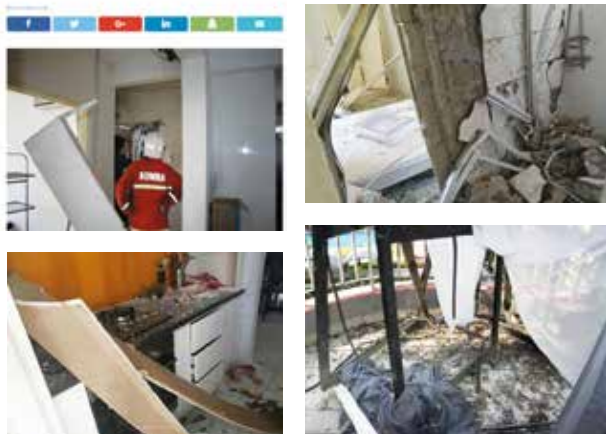
Introduction

There are different types and ranges of water heaters in the Malaysian market. They mainly consist of (1) Electric Instant Water Heater, (2) Electric Storage Water Heater, (3) Solar Water Heater and (4) Industrial Heat Pump for commercial/hotel applications. Based on the number of units sold per annum in the Malaysian marketplace, the Instant Electric Water Heater is always the best seller (500,000 units sold per year) followed by the Electric Storage Water Heater (80,000 units per year) and the Solar Water Heater (20,000 units per year).

From the above statistics, it is without doubt that the Electric Storage Water Heater is one of the popular methods of heating water in the Malaysian household, particularly for bathrooms in luxury condominiums, service apartments, SOHO and SOVO. The small size storage water heater (30 - 50 litres) were installed above the bathroom plaster ceiling without users noticing it at all. With increasing usage & long service life of Electric Storage Water Heater, some maintenance aspects of the safety measures are often overlooked & neglected. Recently there was an accident happened in February 2017, the bathroom of a luxury condominium was destroyed in an explosion caused by an Electric Storage Water heater. It looked like an explosion scene in a movie, but it had actually happened in one's life and it could happened to anyone else.

Image after the electric storage water heater explosion

Hot water boiler explodes in Mont Kiara condo



What could be possibly the root cause of the explosions?

- 1) Pressure relief & drain valve being /blocked spring mechanism jammed.
- 2) Thermostat did not operate to stop heating element from heating.
- 3) Thermal cut-out did not trip to stop heating element from heating.

What are the safety features of Storage Water Heaters?

1) Pressure Relief Valve

This device is install at inlet, works as an expansion valve, it prevents build-up of water pressure to over Product's Maximum Rated Pressure (usually 8.5 to 10.0 bar) by discharging the excess pressure through the overflow vent. It should not be removed from the heater. It is recommended that the Pressure Relief Valve be serviced by a qualified plumber at least once a year, and change to a new PRV unit every 5 years.

2) Thermostat

Thermostat is an Automatic Temperature Control System, which presets the temperature at the most economical setting of 70 degrees Celsius ($^{\circ}\text{C}$) for normal usage. The green light indicator of product will light up when temperature is below this setting (usually 60°C), and goes off when temperature reaches this setting. This simple means, the thermostat is self-resetting, it connects the power supply to heater, and disconnects the power supply to the heater when the water temperature reaches 70°C .

3) Thermal Cut-Out

In the event the thermostat fails, the Overload Temperature Control System will cut off the electrical supply when the temperature reaches approximately 95°C . The red and green light indicators on the product will go off and the heater will stop functioning. This cut-off action is manual-resettable. However, the users are not allowed to reset it on their own. They will need to call a technician to check what is causing the thermal-cut to trip, and thus to remedy it accordingly.

Case Study / Last Accident Report (see underlined)

Water heater type	Storage water heater
Where	At a resort
When	December 2014
Accident	Water heater exploded – a non-fatal accident

Background

Water heater was installed around the middle of 2010. It was of a model with approval from the Energy Commission. It was purchased from the supplier and installed by the client's technician. The water heater had a guarantee period of 6 months.

Findings

There were no records of maintenance. There was no RCD with a residual operating current of 10mA installed in the water heater circuit. The drain valve was found to be closed. (By referring to the water heater Operating Manual, the drain valve should always be in an open position).

The last user of the water heater did not/forgot to turn off the electricity supply to the water heater after using it.

The following safety features did not operate:-

- i. Pressure Relief and Drain Valve (the drain valve was closed)
- ii. Thermostat
- iii. Thermal Cut-Out

The majority of the Instant Water Heaters in Malaysia are Open Outlet Water Heaters, where the stop valve is installed at the inlet of the water heater. Hence there is no pressure exerted inside the heating canister of the product (Fig 1). The pressure is negligible for the Electric Instant Water Heater during operation and idling/standby. As for the Storage Water Heater, a Closed Outlet Water Heater connects to many points in the bathroom, where the stop valve is actually at the point of use at the mixer tap of each location. For most of the time, it is on standby mode with pressure in the system exerted at 6-8 bars. Imagine a person who keeps on pumping a tyre with high pressure air. It will cause the tyre to explode into pieces and this could very well be fatal. It is the same case with the Electric Storage Water Heater when the Pressure Relief Valve (PRV) and Thermal Cut-Off both fail. It will slowly become a 'ticking time bomb' simply because water has been continuously heated up and turned into hot steam. When air turns into hot steam it can be compressed to 1,600 times of the original volume of water. Similarly, when the heater tank is pressurized until 25 to 30 bars, it will explode at any time.



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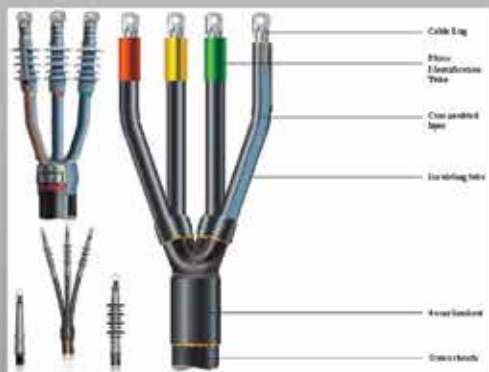


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Industry Talk on Recognition of Prior Achievement

TEEAM organised a half-day Talk on Recognition of Prior Achievement (APA) on 25th April 2017 at the TEEAM Conference Room. The distinguished speaker was Mr Perumal Vengadasalam who is a Council Member of TEEAM and is also a member of the Education & Training Committee of TEEAM.

APA is a Government-Industry Certification method to give due recognition to any individual who can demonstrate his or her occupational skills as outlined in the National Occupational Skills Standard (NOSS), based on prior experience and achievements. Candidates need not go through formal training or sit for an examination. Their skills and knowledge will be assessed according

to their competencies as outlined in the NOSS. All that is required of them is to prepare a Work Portfolio (Documentation) to prove their competency for assessment.

The Malaysian Skills Certificate (Sijil Kemahiran Malaysia – SKM) issued by the Department of Skills Development (Jabatan Pembangunan Kemahiran – JPK) will be awarded once candidates are assessed and verified by JPK.

The talk attracted members who had expressed their desire to take part. Overall, the talk succeeded in motivating the participants to be even more committed to their job.



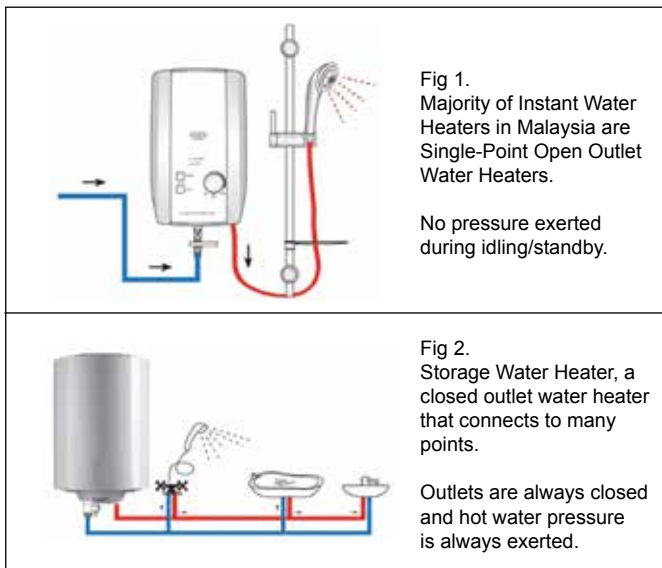
Distinguished Speaker – Mr Perumal Vengadasalam highlighting the necessary documents required for preparing the work portfolio for APA certification purposes.



Discussion – Participants understanding the requirements and procedures for the APA Certification.



..... Continue The Risk of Explosion of Electric Storage Water Heaters in Malaysia



To Improve the Safety of the Electric Storage Water Heater

- 1) Regularly inspect the Thermostat operation and ensure that it is always in good working condition. This can be checked by observing the green light, whether it is turning on or off.
- 2) Regularly inspect the Thermal Cut-Out operation and ensure that it is always in good/proper working condition. This can be confirmed when both the lights are off (which indicate the abnormal state).

- 3) Regularly inspect the Pressure Relief Valve (PRV) operation and ensure that it is always in good working condition by lifting the lever to release water. This can prevent the spring in the PRV from getting jammed.
- 4) Over a long period of usage, the internal parts of the heater tank that are in direct contact with hot water will accumulate scalings, that is, lime scale. In order to ensure that the heater works properly, it is important that the lime scale be removed from the Heating Element and Pressure Relief Valve. Refer to the cleaning procedures as outlined in the operation manual.
- 5) Strictly follow the manufacturer's advice on the maintenance schedule. Do not assume that the product lasts forever after installation.

Conclusion

Electric Storage Water Heater users need to make sure that their Electric Storage Water Heater are maintained periodically.

The Pressure Relief Valve is recommended to be changed every 5 years, the discharge / drain area of PRV should not be blocked, and also, inspect the operation of thermostat regularly.

Mr Choo Wei Seng is the Factory Manager of ShowerTec Industries Sdn Bhd, a Manufacturer of Electric Water Heaters. He is also an active Committee Member of the SIRIM Working Group WG02 for Household Heating Appliances, and Working Group WG01 for Household Electric Motor Appliances. Over the years, he has kindly helped by suggesting ideas and changes in developing the Code of Practices, the Safety of Household and Electrical Appliances for MS and also that of IEC Standards.



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TEEAM appeals to members to help in recruiting companies and individuals to join the association to strengthen TEEAM's membership base. Incentives are offered by the Membership Recruitment Committee. Members introducing a company member will be entitled for two points, while introducing an individual member will be entitled for one point. The points can be accumulated and used to redeem free advertisements in Suara TEEAM or redeem membership subscription.

Special privilege for new company members joining TEEAM between January-June 2017 is that your company profile will be published in our website.

For details, please contact the TEEAM Secretariat at Tel: +603 – 9221 4417. The membership application form can be downloaded from the TEEAM website at www.teeam.org.my.

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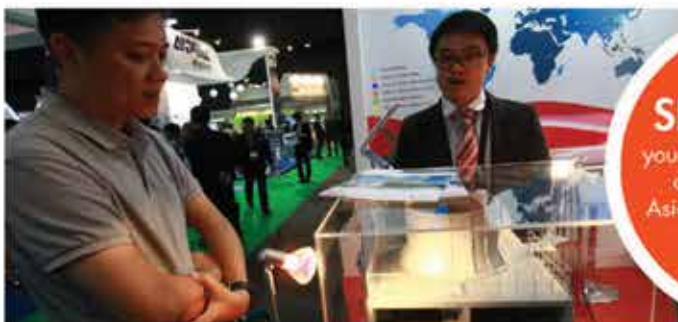
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