香港空調及冷凍商會有限公司
THE HONG KONG AIR CONDITIONING AND REFRIGERATION ASSOCIATION LIMITED

WINTER 2014
Newsletter 會員通訊

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Message from the President

Dave Chan *President*

In the AGM held in June this year, a new council comprising of 21 members was elected for the term 2014-16. It is my great honour to be elected as the President of ACRA for this term. I would like to take this opportunity to thank all our members for their continuous support to the council and ACRA.

Our membership has grown significantly over the years and today we have 157 members from all trades of business in the air-conditioning industry. We have also expanded the size of the council with two new members joining the council. The new council now has a diversified and all-rounded expertise on technical, contractual, legal, marketing, finance and project management. It will enable us to better serve our members and the air-conditioning industry as a whole.

The construction industry is still booming where many of our members have benefited from but at the same time we are facing a number of challenges ahead. One of them is the shortage of skilled labour and technicians. To overcome this challenge, two incentive schemes – CCTS (E&M) and TSS have been in place to attract new blood for the construction workforce and engineering apprentices respectively. Not only will ACRA continue our full support for these two schemes, but also we will be proactively providing feedback to the authorities to fine tune the systems and procedures. Our goal is to use this system to train up more qualified workers and technicians for our industry.

In addition, ACRA has been working closely with FEMC, its constituent associations, EMSD, CIC, other government bodies and statutory organizations to promote our E&M industry and to uplift our professional image with a hope to attract more new blood to join. We will continue our joint effort with all stakeholders to organize more marketing and promotional activities in 2015.

Another challenge facing our industry is the continuous rise of labour cost. This phenomenon has not only imposed contractual rise to new contracts but also to maintenance term contract with longer duration. In view of this, ACRA is now exploring with EMSD on how to apply Contract Price Fluctuation Scheme (CPFS) in the air-conditioning maintenance term contracts. Our objective is to work out a mechanism which can hedge the risks of rising labour cost as well as minimizing the impact should the rising trend reversed in future.

Another way to alleviate the labour shortage problem is to equip our current engineering staff with better knowledge and skills. As such, training will also be our focus in this term. Our training committee will use our in-house expertise and/or partnership with other professional bodies to organize more practical training workshops and technology seminars to our young engineers.

The current Code of Practice (2012 Edition) under the Building Energy Efficiency Ordinance has been in place for two years. To keep pace with the technological advancement and to uplift the energy efficiency standards, EMSD has started the review process for the codes. ACRA have active participation in the working group and task forces for reviewing the codes on air-conditioning installations, energy audit and performance-based approach. We will leverage our technical strength on air-conditioning technologies and applications to make contribution in the review process.

Activities in ACRA are not just on business or engineering; we also have a loving heart and care about our community. Through our caring committee, we will organize regular caring activities for members to help people in need.

Finally, I wish to thank FEMC and its Constituent Associations, government, statutory and professional bodies for their continuous support to ACRA over the years.

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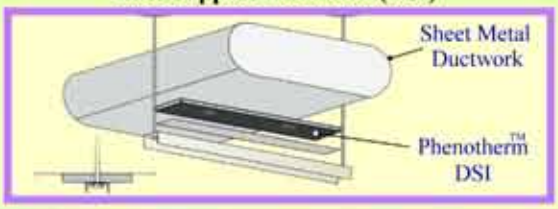

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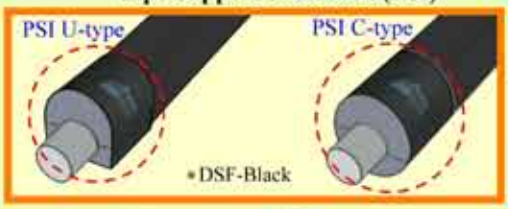

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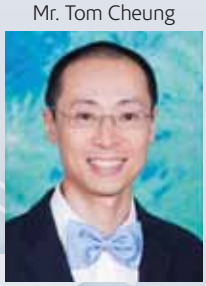

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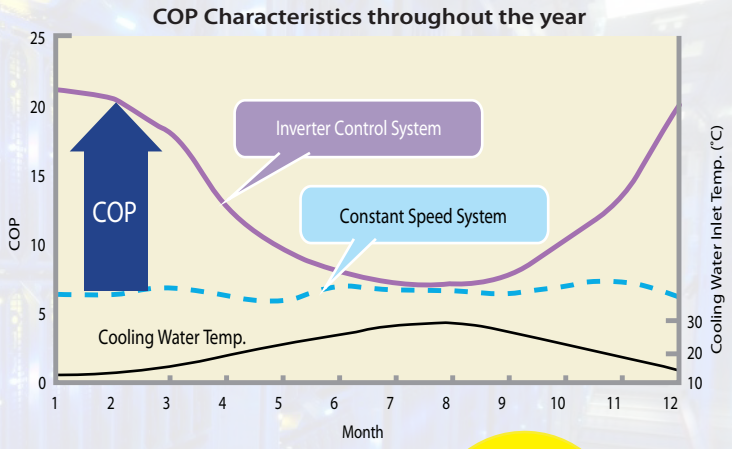

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Soaring Construction Costs – A Challenge for Change

"Construct for Excellence" remains a leading report today published in January 2001 examining the construction industry of Hong Kong in respect of quality, quantity, environmental friendliness, manpower, safety and supervision striving for ways to improve efficiency and cost effectiveness in terms of quality, customer satisfaction, timeliness in delivery and value for money. Vision was formulated for an integrated construction industry that is capable of continuous improvement towards excellence in a market-driven environment. More than ten years on, what visible improvement the industry has achieved or the industry remains its status quo with few exceptions of some landmark buildings accredited with green labels serving marketing purpose, generating more guidelines and regulations for paper works administration or passing few more legislations for construction health and safety and building energy efficiency? Rapidly rising and overrunning construction costs and completion delays arising from labour shortage are great concern expressed not only by the industry but also becoming a social and economic issue affecting the livelihood of the people facing shortage and unaffordable housing and inflation in disposal expenditures.

Construction booming resulting from the government's ambitious infrastructure development in express rail link, railway extensions and boundary crossing facilities and related link roads, new and redevelopment hospitals, long term housing strategy on increasing the supply of residential flat units and RMAA works (repair, maintenance, alternative and addition works) continue in coming years. The government spending on construction has been budgeted to an outlay of HK80 billion this year and will continue with this magnitude of yearly capital outlay, while the private sector by rule of thumb in the past will generate another half turnover although with a moderate proportion in these years. This trend is likely to continue in the longer term forecasted at a total construction expenditure reaching HK175 billion annually at 2013 pricing. The labour market has been over stretched the demand for workers at all skill levels and construction professionals for local construction sites given part of this labour supply pool is shared by the construction of major gamming resorts in Macau continues in full swing and targeted to complete in late 2015 and 2016.

Breakdown costs although vary among different projects and E&M trades, which are generally contributed by labour easily shot up to 35% to 45%, materials and equipment another 40% to 50%, thus leaving the remaining about 10% to 20% for engineering, project management and administration, miscellaneous cost outlays for statutory compliance and insurance and finally very slim profit margin. Costs taken up by labour and materials and equipment are two major cost elements, one is affected by the social and economic factors internal to Hong Kong and the other follows the currency fluctuation and international market respectively. The remaining costs are determined by the contract requirements and how the projects are executed and delivered as well as the compliances to satisfy statutory requirements for construction health, safety, environment, mandatory insurances and construction levies.

Although there are about 330,000 registered construction workers, only about 240,000 are active in the labour pool for construction works and about 190,000 are counted in construction sites in any single day. The shortage at present is estimated at a level of 10,000. A snapshot survey was done in April 2014 for E&M workers working in construction sites, there were around 20,000 reported and about 3,400 shortage in that period. According to the data released by Macau Human Resources Office, HK construction workers registered to work in Macau have reached nearly 5,000 there and most of them are skilled workers. The industry has not attracted as many young people in past many years resulting over 40% of them have reached the age of 50 and above. Most of the trades have seen their wages increased by few percents yearly in the past to about 10% or more since last one or two years reflecting the acute shortage driving up the wage level.

Great effort has been collaborated among government, CIC, VTC, unions and trade associations to launch training programs, apprentice schemes, promotion campaigns, recruitment fairs and employment centres to attract younger people to join and experienced workers to return to the construction workplace. Using imported labour for major construction projects has been rolled out by the government to alleviate the acute manpower shortage and strong labour demand, but a balance to be struck to preserve the interests of local workers and avoid the excessive social burden caused by the foreign workers work and living in HK. Infrastructure projects at boarder locations and major railway projects are given priority consideration by the government on applications submitted by the contractors who have proved to satisfy the Labour Advisory Board and Labour Department that there is genuine shortage and the vacancies cannot be recruited from local labour pool.

With construction inflation persistently exceeding the overall inflation rate of Hong Kong, solution in short term such as labour importation in the next very few years has been in pipeline, and exhausting more efficient design and construction practice with reshuffle of the entire construction process and strategic application of industrial engineering for process planning, new construction methods, application of technology and deployment of construction plants for long term management of labour and manpower shortage and rising costs shall be the way to explore. Importing labour outside HK to put up the construction and installation remaining with the outdated or traditional and low productivity methods is for short term alleviation but not a sustainable approach for the industry.

"Buildable Design" with an appraisal system to evaluate and measure the impact of a design in the use of labour and its productivity level is a legislation enforced in Singapore. Only the designs with buildable design score reaching and exceeding a prescribed minimum score for ensuring higher productivity will be given approval on its building plans. This mandatory requirement for buildable design ensures developers, architects, designers, contractors and subcontractors striving to minimize the use of site labour and raise up the productivity carefully considered in the design, use of materials and equipment, logistics and works process. Prefabrication, integrated equipment, modular construction, widely use of mobile platform, installation plant and cordless hand tools, etc. for streamlining the installation process and reducing the reliance on site labour have been widely implemented in E&M. Standardization, simplicity and single integrated elements are "3S" principles in buildable design together with the use of labour efficient construction methods and technologies for improving constructability and site labour productivity shall be implemented in design and construction planning.

While contractor's input to the design, use of materials and equipment and project planning will lead to efficient and buildable solutions, contractors and specialists shall be engaged in early stage of the process. There are better value for money and time management through collaborative procurement and early engagement of contractors and specialists. This procurement model integrating the traditional development, procurement and implementation into a partnering process, thus resulting costs and time saving and improving teamwork, quality, programme security and satisfactions. There are amble opportunities in buildable design and constructability with the involvement of contractors and specialists in the design and early project stage.

Construction industry has long been labeled as fragmented with adversarial culture involving multi contract parties and tiers of participants pursuing their individual interests and lack of mutual trust and cooperation. The government has been

Soaring Construction Costs – A Challenge for Change

actively rolling out contracts adopting NEC3 collaborative form of contract forms to cultivate and drive the industry towards collaborative and partnering environment through the positive experience and impacts earned from public works contracts. Prolong submission and approval process engaging engineering resources in paper works and holding up the materials and equipment procurement and works flow on site, unplanned design changes causing interruption to engineering works, works flow and programme, lack of process and logistic coordination on site that labour resources are not fully utilized but often kept idling and programme delays causing the subsequent works to accelerate and carried out on overtime are some common inefficiency and wastages in the industry. Industry engineering shall be a turnaround attempt for integrated planning of the entire process with partnering commitment involving design, submission, approval, procurement, logistics and works flow on site in coordination among different contract parties, tiers of contractors and trades shall be explored for improvement of productivity and reduction of idling and wastages resulting in costs and time reduction and saving.

Soaring construction costs is not only a challenge to the construction industry striving to improve its efficiency and productivity through board consensus and commitment spread across the whole industry, but it is also a challenge to the society which pays for the inefficiency and wastage in the construction and development of Hong Kong. Visibility shall be set by the industry in collaborative effort for change and turnaround and build up a culture and spirit for mutual trust and cooperation working towards "an integrated construction industry that is capable of continuous improvement towards excellence in a market-driven environment".

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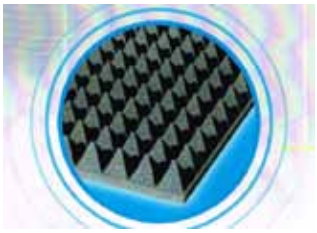

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People Interview with S K Au Yeung

我們今次很榮幸能跟歐陽肇強先生取經。歐陽肇強先生於機電設備行業貢獻良多，時至今日已服務超過40年了。歐陽先生於80年代為英國特許屋宇裝備工程師學會香港分會委員、香港工程師學會電機小組委員、屋宇裝備小組委員及電機小組委員理事會理事，機電工程署升降機及自動梯紀律審裁委員團成員。於2002-2006年為澳洲工程師協會香港分會委員，於2004-2005年為該會香港分會會長，1996-2009年為中華電力有限公司地區客戶諮詢委員，現時也是中華電力有限公司榮譽客戶諮詢委員。

從香港尖子至機電設備行業的國際精英：

歐陽肇強先生曾是香港皇仁書院的尖子，1971年畢業於香港大學電機工程系，取得一級榮譽學位，機緣巧合下投身機電設備行業，踏上機電設備行業的國際精英之路，一做便43年了。歐陽先生於大學畢業的前半年，當時很多新加坡畢業生規定要當兵，因此行業上缺乏人手，新加坡政府唯有向香港招兵買馬，很多同學都填寫了申請表，歐陽先生和十幾個同學畢業後與新加坡政府簽訂了三年合約，一起到新加坡政府工作。當年新加坡的機電設備行業仍處於起步的階段，歐陽先生入職後才知悉是與機電設備的設計及維修保養有關的工作。三年合約未完之前，澧信工程有限公司的經理於新加坡登報招募人才，歐陽先生寫信應徵，成功獲得取錄。1974年，歐陽先生回港於澧信工程有限公司任職高級工程師。1984年，歐陽先生已成為澧信工程有限公司的合夥人之一，直到1993年才移民澳洲，一共於澧信工程有限公司工作了19年。在這期間，歐陽先生接觸到機電設備行業不同的範疇，包括空調設備、電力供應、消防及給排水設備的安裝。1996年7月中，歐陽先生返港於新鴻基地產發展有限公司任職屋宇裝備總工程師，專門管理屋宇裝備的工程，及為集團其下負責建築的子公司的屋宇裝備項目經理，直到今年一月才正式退休，為新鴻基地產發展有限公司的環境主任及顧問。

從最難忘的三個工程項目中學習、成長 — 溝通至為重要：

歐陽先生曾負責很多香港、新加坡及中國內地城市不同的工程項目，以香港體育館、國際金融中心及環球貿易廣場最具代表性及最具挑戰性。

香港體育館：這項工程非常複雜及很有難度，當時找不到有類似經驗的前輩可以讓歐陽先生詢問，他花了很多功夫在這項目上，亦曾多次作自行測試。這工程還包括了巨大空調及滑冰場的製冷設備、觀看台及舞台創新的照明系統。當時遇到其中一個要解決的大問題是吊燈因諧波產生的震動而發出嘈雜的聲音，後來多次測試後，把鎮流器（Ballast）的鐵箱改為木材，聲音才消除了。

國際金融中心：當時歐陽先生是做工程管理，他的上司委派他參與建築部，跟大伙兒群策群力，從客人不斷的訴求中，了解到他們的不同需要，當中歐陽先生學習到很多東西，他認為建築的流程及運輸規則方面等往往會影響機電設計及安裝程序，溝通至為重要。

環球貿易廣場：以水冷設備曾被授予很多獎項，當時歐陽先生是負責做項目工程經理的。由於用水冷設備可以節能，

原本的設計概念就是用海水冷卻系統，但歐陽先生十分擔心使用已預先埋藏地下差不多十年的幾條海水喉管損壞而影響大廈的工程進度，所以修改了設計而選擇了當時政府剛剛批准的淡水冷卻製冷系統，事後發現有部份預埋的海水喉管真的壞了。該項目的另外一個挑戰是大廈的分期入伙問題，下層租客已經進入大廈運作，上層的大廈還是在建築的階段，當中需要花很多時間跟租客溝通才能解決問題。環球貿易廣場跟理工大學合作研究省電模式，不斷進行微調。歐陽先生認為如果於開始時物業管理就投用這些省電模式系統，所需的投資也不是太多，若可以先做好能源審核，使用適合的系統，必定可幫助業主節省能源及金錢。

節能、綠色設計及科技為行業未來發展趨勢的想望：

歐陽先生認為，節能及綠色設計為現時的趨勢，缺乏管理人才及工人是現時的最大的問題，這亦會影響對整體行業的發展。未來的幾年在繪圖方面會有大突破，電腦繪圖現今已經廣範應用，以前都是用雙維的，後來發展到三維的建築資訊模型（Building Information Modeling），不但可以改善工地施工協調方面的問題，亦可簡化人手和減少不必要的廢料。

給後輩的話 — 開明、不斷改變、加強溝通去維持良好的合作關係:

歐陽先生勉勵後輩要跟上時代的新知識、技術、以及明白用家不斷改變的需要是十分重要的。其次是，必須要跟同事維持良好的合作關係和擁有開明的思想，尊重別人的意見，以不同角度看待問題，加強溝通及提高表達技巧和管理的能力。

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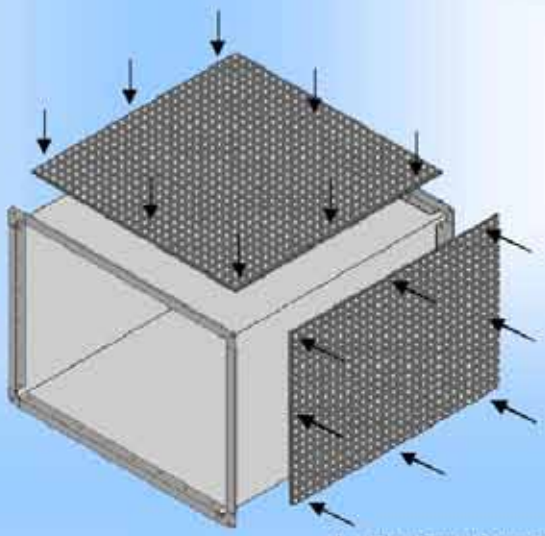

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Upgrading of Energy Efficiency Standards under the **Mandatory Energy Efficiency Labelling Scheme (MEELS)**

EMSD issued a new version of Code of Practice of the above grading standard on 31 October 2014. In Section 7 of the document is the Energy Efficiency Labelling for Room Air Conditioners (RAC). Major changes to the labelling requirements are :

1. At present, under MEELS, energy efficiency performance of RAC is measured and evaluated at full load, the ratio of energy capacity and energy consumption is expressed as Energy Efficiency Ratio (EER). However, the EER in full load does not take into account the operational pattern in part load performance of variable capacity RAC and hence cannot reflect their actual performance in response to demand;

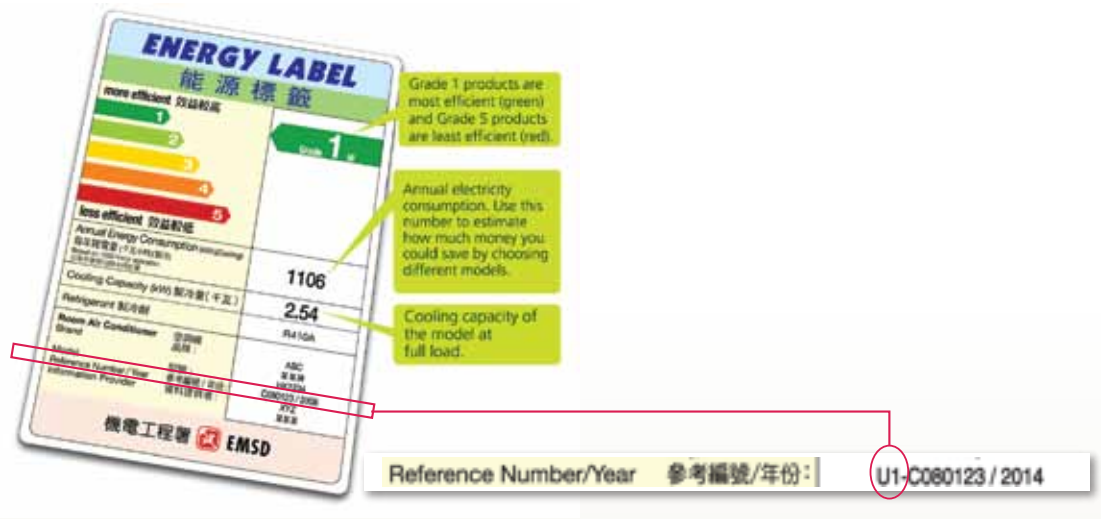
2. "Cooling Seasonal Performance Factor" (CSPF) is used to evaluate of the energy performance of RACs. CSPF is defined as "ratio of the total annual amount of heat that the equipment can remove from the indoor air when operated for cooling in active mode to the total annual amount of energy consumed by the equipment during the same period" Therefore, it is an evaluation of the energy efficiency performance of a RAC over a time period instead of a single point at full load; and

3. In additional to the standard ISO5151 to measure the cooling capacity and power consumption at full load under current MEELS, another standard ISO16358-1 will be included for determination of CSPF.

4. Test point to determine are summarized as below :

Test	Test Condition	Characteristics	Fixed	Two-Stage	Multi-Stage	Variable
Standard cooling capacity	Indoor : DB27°C, WB19°C Outdoor : DB35°C, WB 24°C	Full Capacity and Full Power Input	Test Required	Test Required	Test Required	Test Required
		Half Capacity and Half Power Input	No Test Required	No Test Required	Note	No Test Required
		Minimum Capacity and Minimum Power Input	No Test Required	Note	No Test Required	No Test Required
Low temperature cooling capacity	Indoor : DB27°C, WB19°C Outdoor : DB29°C, WB 24°C	Full Capacity and Full Power Input	Note	Note	Note	Note
		Half Capacity and Half Power Input	No Test Required	No Test Required	Test Required	Note
		Minimum Capacity and Minimum Power Input	No Test Required	Test Required	No Test Required	No Test Required

Note *Default Values* *Capacity in 29°C = 1.077 x Capacity in 35°C*
Power input in 29°C = 0.914 x Power input in 35°C



The defined cooling load will be assumed linearly changing depending on the change of outdoor temperature from 24°C to 36°C, where full load condition in 35°C. The CSPF shall be calculated at outdoor temperature bin distribution in 13 Bins totally in 1,200 hours operation annually. The CSPF of fixed capacity RAC will be slightly higher than the EER value in pervious standard, but CSPF of variable capacity RAC will be much higher e.g. EER=3.18, CSPF=4.95.

**The new Code of Practice is available on website :*
http://www.energylabel.emsd.gov.hk/en/doc/2014%20MEELS%20Code%20of%20Practice%20(Eng)%20(Final).pdf

Impacts of the New Grading System

Energy Efficiency Grade	Window Type		Split Type	
	EER (Current)	CSPF (New)	EER (Current)	CSPF (New)
1	2.66≦EER	3.00≦CSPF	3.04≦EER	4.50≦CSPF
2	2.38≦EER<2.66	2.80≦CSPF <3.00	2.72≦EER<3.04	3.50≦CSPF <4.50
3	2.15≦EER<2.38	2.60≦CSPF <2.80	2.46≦EER<2.72	3.15≦CSPF <3.50
4	1.89≦EER<2.15	2.40≦CSPF <2.60	2.15≦EER<2.46	2.80≦CSPF <3.15
5	EER<1.89	CSPF <2.40	EER<2.15	CSPF <2.80

Impacts of the New Grading System :

1. Although SEER and EER are two different performance standards for variable capacity type RAC, the grading of existing Grade 1 fixed capacity split type RAC e.g. EER 3.1 will fall to Grade 4 in new grading system. Only variable capacity split type RAC will be Grade 1 or 2 products in the new grading. However, only 250 nos. of RAC models are inverter type out of 2017 nos. registered RAC models in MEELS on October 2014;

2. No variable capacity type window RAC of common brands available in Hong Kong Market;

3. The existing Code of Practice for Energy Efficiency of Building Service Installation (BEC) Clause 6.12.2 stipulates that unitary air conditioner should fulfill the requirements of Energy Efficiency Grade 1 or Grade 2 specified in the MEEL Scheme. It is estimated only 20-30% of RAC in Hong Kong market can meet this requirement as the new grading, hence, customers may have a few of selection;

4. Same "Energy Label" as previous will be used in the new version with only adding "U1" to the "Reference Number/Year". That may confuse the customers between existing and new grading e.g. why Grade 1 become Grade 4 for EER or CSPF=3.1 split type RAC.

Grace Period of the above changes is granted till 24, November 2015. The energy labels of room air conditioners supplied on or after 25 November 2015 shall conform with this version of Code.

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No Welding Piping – A Modern Solution to Traditional Pipe Joints

With rising costs and shortage of skilled labour, there is immense pressure on construction industry to raise productivity and quality. Welding commonly used in pipe joints not only requires skilled labour but also imposes fire risk. The quality (leakage) of installation depends on the skill of installers and use of appropriate flux of good quality.

Compression fit and press fit pipe fitting technologies offer zero leakage refrigerant pipe connection for HVAC air conditioning and DX VRF systems open up cost-effective opportunities for the industry. Such technologies are applicable to both aluminum and copper pipe fittings.

Installations not requiring welding means no heat, no hot works permit, no fire alarm stand down, no extra insurance, no standby workers and no oxidation. Residues of welding may cause blocked filters and damaged compressors that can now be completely eliminated.

Pipe joints can be installed by non-skilled labour with simple on the job training. The pipe connectors offer an almost perfect seal, giving a leak-free system that does not depend on skill of installers. Such installation technology offers consistent quality with reduced installation time and labour cost, as well as enabling tenants to start business in their premises earlier. As the joints are guaranteed zero leakage, rework of welding and troubles for traditional welded pipes are eliminated. However, in order to apply this technology, contractors must invest compression fit guns as installation tool. Such guns are expensive but can be used for a long time.

When comparing aluminum and copper pipes in compression fit system, aluminum is easier to achieve tight bends without heating and outperforms copper in high pressure applications.

This technology of compression fit and press fit pipe fitting has increasingly been applied to the current market provided its strength, durability and pressure which concluded the system is suitable for the use on A/C systems of all types.

Eliminating flames in installation promotes safety and peace of mind to all stakeholders and saves costs for all parties involved.

Application update of **Fresh Water Cooling Towers Scheme for Air Conditioning Systems**

Prepared by: Daniel Chong

Background and Introduction:

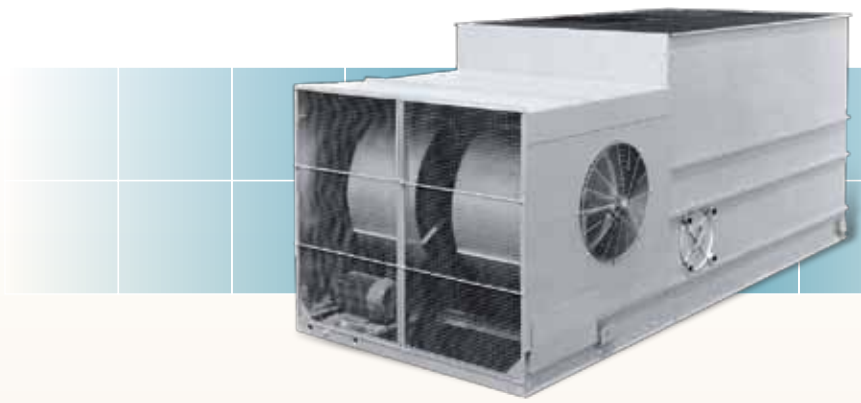
In Hong Kong, the energy used in the air-conditioning system is approximately some 30% of the total electrical consumption of which over 70% was consumed by non-domestic buildings. The use of water-cooled air conditioning system is, in general, having energy saving of 25-30%. In view of environmental considerations to minimize the emission of greenhouse gases from the power generation plants and the growing demands on the air-conditioning system in time, after launching of the pilot scheme successfully for 8 years, HKSAR promulgated it as a standing scheme in 1 June 2008 and reviewed in 2010 to streamline the application procedures and requirement. Along the time of the development, there has been update of the Scheme. Here we would like to give an overview of those. The regulatory and institutional framework with updating requirements in the Code of Practice (CoP) both on Water-cooled Air Conditioning Systems (WACS) and Prevention of Legionnaires' Disease can be accessed from EMSD's web-site: www.emsd.gov.hk

The Scheme In Brief:

The CoP (WACS) comprises three parts:
Part 1: Design, Installation and Commissioning of Cooling Towers
Part 2: Operation and Maintenance of Cooling Towers
Part 3: Water Treatment Methods for Cooling Towers

In essence, for registration of cooling tower installations under the Scheme, it is a MUST that the cooling tower is located minimum 7.5m away from the air intake/exhaust, operable windows, pedestrian thoroughfare and public access. Other practical issues are:

1) An independent water supply system with appropriate capacity water make-up tank shall be provided.
2) Cooling Tower water bleed-off system with break tank for the discharged water.
3) Choose acceptable type cooling towers with proven document on the technical and operation data.
4) The roof top structure and space available is sound for the installation.

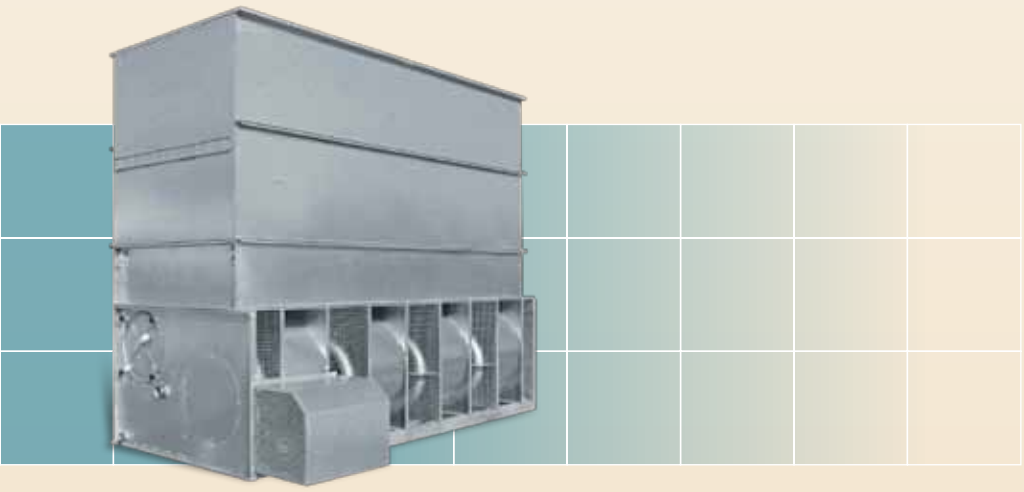


Update of the Application Procedures:

1. Employ Authorized Person (AP), Building Contractor or Minor Work Contractor and License Plumber (LP) as appropriate, to submit to Building Authority (BA) and Water Authority (WA) on building works procedures and plumbing proposal respectively.
2. Submit Form CT1A to EMSD for preliminary assessment and acceptance in principle of the application.
3. Submit Form CT1B with details in Form CT4 to notify EMSD on Commencement of Cooling Tower Installation Work.
4. If the project required completion in phases, submit form CT2A with completed site inspection report to EMSD. Keep monthly operational records in Form CT3 for EMSD's inspection upon request. The record has to be included in the annual audit report.
5. When the entire installation completed, submit Form CT2B together with the completed site inspection report to EMSD.
6. LP apply to WA using Form WWO46 (Part IV) and BA to report on completion of building works. When all in order, water supply will be connected to the installation.
7. Employ Registered Energy Assessor (REA) to submit to EMSD within 30 days upon completion on the Form of Compliance in accordance with BEEO, Forms are EE-4, EE-AC, EE-EL and EE-SU.
8. Cooling Towers owners shall keep monthly operational records vide Form CT3 for EMSD's inspection upon request, and submit annual audit report.
9. When changing of ownership occurs, the existing and the new owners shall submit the Form CT5 to EMSD for record.

Conclusions & Remarks:

This scheme applies to all non-domestic types of new and existing buildings on the use of fresh water for air-conditioning system. Although there is quite a number of water cooled air-conditioning systems being installed in Hong Kong without entering this control scheme for whatever reasons, thanks for the unfailing effort of EMSD, all such are under their closed monitoring. Nevertheless, should the installation cannot fulfill requirement on CoP (WACS), for health and safety considerations, we strongly appeal to all fellow members to propose to all your clients to change their air conditioning system to air-cooled type in this regard.



Kai Tak District Cooling System

By: Rocky Law

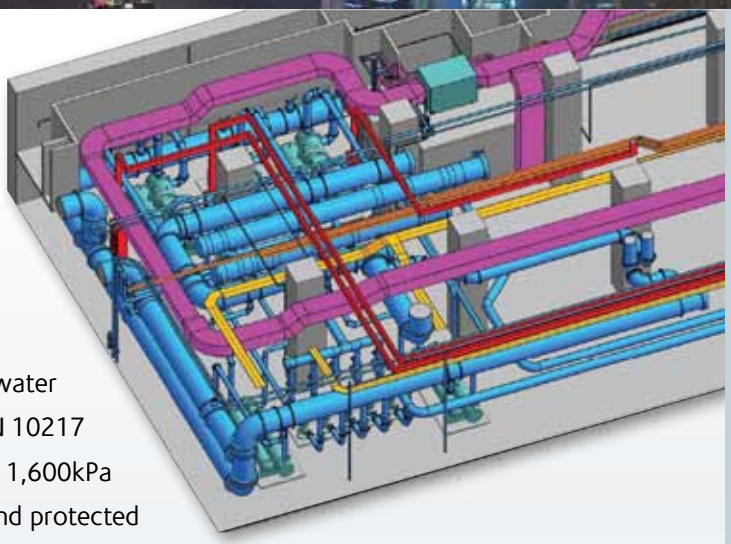
Project Name	**: Design, Build and Operate the District Cooling System at Kai Tak Development**
Member's Role in the Project	**: Design and Build of District Cooling System and all auxiliary E&M Services**
Completion Year	**: 2014**
Member/Company Name	**: Young's Engineering Co. Ltd.**

This project involves the design-build-operate a District Cooling System (DCS) at Kai Tak development. As the Kai Tak development occupies a site area of some 460 hectares that will be developed in phases over a period of approximately 15 years, DCS system is adopted to provide climate control for about 1.73km of combined floor constructed in phases according to the master development program.

DCS offers many advantages such as somewhat 35% and 20% more efficient than air-cooled and water-cooled A/C systems respectively, reduction in electricity consumption by 85 million kWh per year (i.e. 25,700 household on 3,300kWh per year) and reduction of carbon emission by 59,500 tons per year. As the central chiller plant has been installed in this DCS, all the individual users/consumers are benefited by purchasing chilled water for their buildings, which minimizes their cost of installation, operations and the plantroom spacing occupied for accommodating their own individual chiller plant.

With different operating profiles and user characteristics of the buildings at Kai Tak Development, twelve categories were defined, such as government institution or community (GIC) buildings, shopping centres, underground MTR stations, tourism node, international stadium, etc., in the feasibility study. Cooling demands consolidated from each category of building were then developed and the DCS plant was designed based on the peak total cooling demand of 284 megawalts (81,000 cooling tons).

The DCS comprises of 3 major components, and they are Central Chiller Plant, Distribution network and Consumer Substation. Two central chiller plants were designed and built for the Kai Tak DCS namely Northern DCS Plantroom and Southern DCS Plantroom, and a sea water pump room was designed and built next to the Southern DCS Plantroom. The Northern DCS Plantroom is situated at the north-western side of Kwun Tong Bypass and northern end of Kai Shing Street in Kai Tak Development Area. It is a semi-above ground RC structure with two levels of basements and serves the sites around the North Apron. The Southern DCS Plantroom is situated at the underground of the Runway Boulevard. It consists of two levels of basement and serves the sites located at the South Apron and Runway Boulevard. The Sea Water Pump Room is also situated at the underground of the Runway Boulevard abutting the Southern DCS Plantroom. It supplies seawater to both Southern and Northern DCS Plants for condensers cooling.



Black carbon steel pipes are adopted for the DCS chilled water distribution network. The pipes are in accordance with BS EN 10217 and the hydraulic pressure rating of the pipes and fittings is 1,600kPa (gauge). The chilled water pipes are factory pre-insulated and protected by a water tight outer jacket made of high density polyethylene (HDPE) and leak detection sensor cable(s) installed and embedded between the pipe jackets. Field joints of the pre-insulated pipe sections are made water-tight by means of connecting at straight sections of pipe to prevent ingress of ground water. The leak detection system enhances system reliability as it will give early warning if the pipe fractures or outer jacket has been broken, so that timely repair can be carried out. Thermal insulation of rigid closed cell polyurethane foam (PU) with a thermal conductivity of 0.0241 W/m°C and minimum density 60kg/m3 is applied to the distribution pipework. It was developed under an energy analysis based on ground temperature data obtained from Hong Kong Observatory that the thermal insulation is optimized to limit the estimated annual energy loss of the chilled water distribution network.

3-pipe system (1 x CHWS, 1 x CHWR, and 1 x CHWS/ CHWR) is adopted for the DCS distribution network on technical merit of reliable and cost effective. The Northern DCS network is in the form of a ring circuit consisted of 2 x 1,000mm plus a 500mm diameter chilled water supply. This arrangement can cater for the low load operations during the initial years and enhance system reliability as the 500mm diameter pipe can be used as a backup for any one of the 8 sections out of the ring main. The Southern DCS network is a combination of radial and ring circuit which supplies DCS chilled water to the Runway Boulevard and South Apron respectively. The distribution network has 6.4km of DCS pipelines and covered a length of 2.1km in the first phase and this network will be ultimately extended to 13km long serving as the infrastructure for supply of chilled water throughout the entire Kai Tak Development.

Every DCS Consumer Substation is built within the lot boundary of the consumer building to convey cooling energy from DCS to the chilled water system of that building. The substations are designed for indirect connection between the DCS distribution network and the building chilled water system through multiple (minimum two nos.) heat exchangers. Indirect connection is chosen instead of direct one because the head loss at every individual substation can be determined in a simple manner by calculating the required system pumping pressure; cross contamination between the DCS loop and the building loop is avoided; primary chilled water system owned by EMSD is protected from interruption which may happen in the buildings; and clear demarcation of system boundary for system liability and maintenance responsibility.

The designed chilled water supply and return temperatures at the primary chilled water side at the substations for KTD DCS under normal operating conditions are 5°C ± 0.5°C and 13°C respectively, whereas the designed chilled water supply and return temperatures at the building chilled water side under normal operating conditions are 6°C ± 0.5°C and 14°C respectively.

DCS came into operations since 2012, providing DCS water to Cruise Terminal Building from Southern DCS Plant and two Housing Estate (Kai Ching Estate and Tak Long Estate) from Northern DCS plant. 9 nos. of chillers with total 8,250 cooling tons (1,250TRx2 + 400TRx2 for Northern DCS Plant; 1,250TRx3 + 600TRx2 for Southern DCS Plant) had been put into operations in the first phase completion, and the distribution network infrastructure and power supply fed by 13 nos. of 2,000kVA transformers allowed for the expanded capacity of DCS in the coming phases had been in place. As the sea water network is to complete following the master program and progress of Kai Tak Development, fresh water cooling tower system had been installed serving the heat rejection system for North DCS Plant. Ozone System and Reverse Osmosis System are enhancement implemented into the condenser circuit to reduce the amount of bleed off water.

Along with the completion of Sea Water Pump Room in 3rd quarter of 2014, all the corresponding equipments, such as penstocks, travelling band screens, sea water pumps, automatic backwash strainers, chlorination plant, etc., are put into full operations. The condenser system of the Southern DCS Plant is then swapped from temporary cooling tower plant to the permanent sea water plant. The temporary cooling tower plant constructed for providing program buffer to the plantroom construction will be dismantled after a period of trial running the permanent sea water plant.

Green initiatives were adopted and implemented in the design, construction and operations and maintenance. Energy efficiency and environmental conservation measures were viable objectives to observe in the construction, operations and life cycle of the installation. Building Information Modeling (BIM) was used such that the E&M services were fully coordinated to resolve crashes that may potentially happen during installation and to improve spatial access for enhancement of operations and maintenance in coming tens of years. Gold Certification of LEED for Northern DCS Plant had been awarded and Southern DCS Plant would also be awarded by completion of the project. TV series [機電夢飛翔] for promotion of the E&M industry to the public for attracting new blood was broadcasted earlier this year, and the successful story of this unique project in the E&M industry of Hong Kong was used in one of its series called [愛在海水冷卻時].

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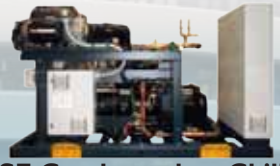

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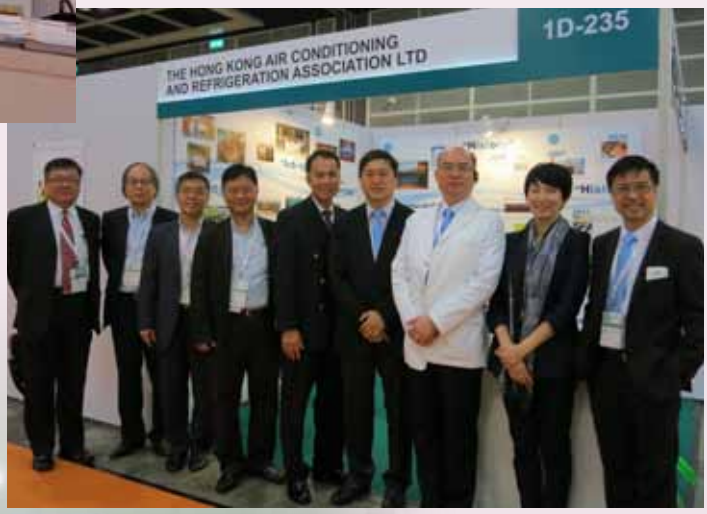
Build4Asia

On 9th – 11th May 2014, ACRA participated Build4Asia Exhibition in Hong Kong Convention and Exhibition Centre. The show gathered more than 500 international and local exhibitors from sustainable architecture, design, building services and electrical engineering industries. ACRA also had a booth at the exhibition to demonstrate its recent seminars, technical visits, social activities, charity program and liaison with government and industry stakeholders for benefit and advancement of the industry and society. Through the presence in different occasions, we will continue to promote ACRA and attract more new members.

Many members visited ACRA's booth to show their support.

ACRA's booth at the exhibition hall.



Horse Racing Night

A fun night out on 14th May 2014 at Happy Valley Racecourse! In addition to the on-track thrills, the evening's excitement also included authentic delicacies, fine wine and 賽馬大亨計獎金比賽！

1st : **WC Fung** *Guest*
2nd : **Bill Cheung** *York International (Northern Asia) Ltd.*
3rd : **KL Chan** *Trane Hong Kong*
4th : **Daniel Mok** *BYME Engineering (HK) Ltd.*

Happy Rice Delivery
粒粒開心贈街坊

It was great to work with Open Door Ministries (開心社區服務) again for Happy Rice Delivery〔粒粒開心贈街坊〕on 18th October 2014 to render warm and care to the elderly living alone or those in need in Lam Tin

ACRA mobilized 86 volunteers to visit 150 households. Apart from bringing the elderly warmth and care, our volunteers also presented them with rice. "This is the third consecutive year that ACRA works with Open Door Ministries for this event. I am glad to come back again and serve the community." said Mr Raymond Synn, Chairman of ACRA Caring Committee.

"It is a meaningful event not only due to the provision of material assistance to the elderly, more importantly our volunteers live out humanity by sharing our care with the elderly. Through the activity, we also aim to arouse the concern of the community towards our senior citizens," said Raymond.

The elderly being visited were cheerful in receiving the warmth and rice brought by volunteers.

What a big team of volunteers from ACRA member companies.

ACRA's volunteers attended the pre-event briefing.

The volunteers delivered their warmth and care, as well as gifts to the elderly.

Mr Raymond Synn, Chairman of ACRA Caring Committee, led and showed his full support in this event.

Training on HVAC System Commissioning

Today's HVAC systems design has been getting increasingly complex in order to meet with the stringent requirements on energy efficiency, indoor air quality and comfort expectations. Commissioning has become an important process to ensure that the HVAC components and systems perform interactively in accordance with the design intent and the owner's operational needs. Proper commissioning can also reduce operating and maintenance costs. All makes "Commissioning" the essential skill for every HVAC engineer in the industry.

On 18th September 2014, ACRA invited Mr Francis Yik, Technical Director of ATAL, to conduct a training on HVAC System Commissioning focusing fundamentals of proportional balancing and innovative chilled water circuit design for in-situ measurement if chiller performance. 150 professionals from the field of HVAC industry attended.

Upcoming Activities

Joyful Dinner
耆英萬歲晚宴

Jointly organized by ACRA Caring Committee and Open Door Ministries (開心社區服務) , the Joyful Dinner will be held again on 6th December 2014 at Lam Tin. Members are welcomed to sponsor the dinner and gifts. Details of the event will be announced very soon.

Spring Dinner

As the kick-off event of 2015, ACRA Spring Dinner will be held in February 2015. We will announce the date and venue of event in January, stay tune with us!

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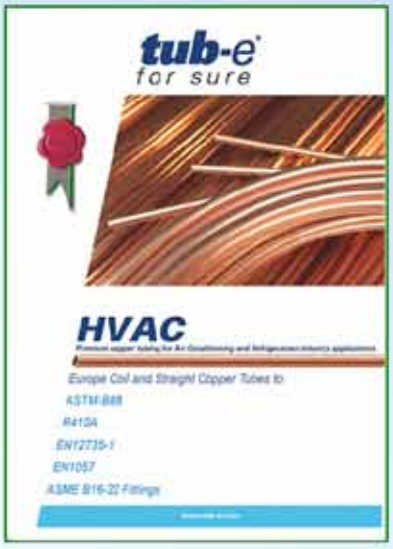
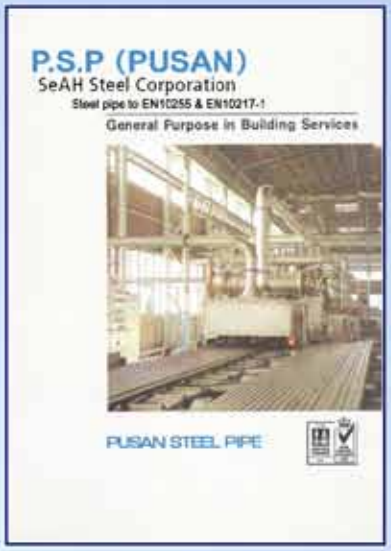
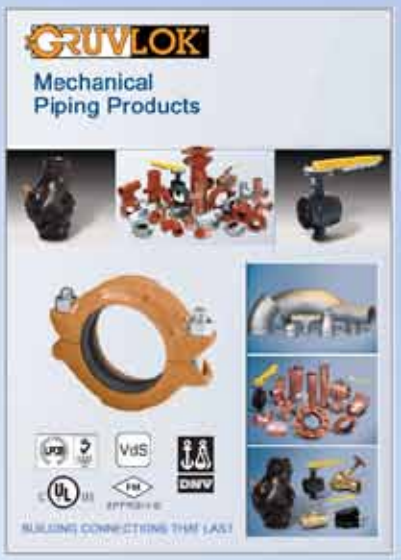
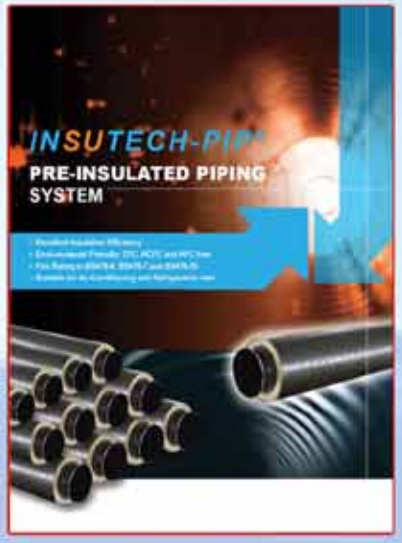
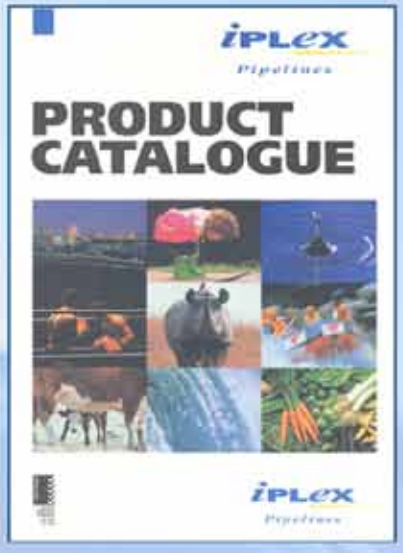
Hilti (HK) Limited	喜利得 (香港) 有限公司	2773 4705	www.hilti.com.hk	Manufacturing
Honest Air Conditioning Limited	明發冷氣有限公司	2396 8108	aircond@netvigator.com	Contracting, Supplier
Hi Tak Thermal & Acoustic Insulation Eng. Limited	喜德保溫隔聲工程有限公司	2770 7703	www.hitakinsul.com	Contracting, Manufacturing, Supplier
H.W. International Air-Conditioning Limited	豪華國際空調有限公司	2796 8888	info@hooair.com	Manufacturing
IES (Hong Kong) Limited	恒豐工程 (香港) 有限公司	2992 0830	weston@ieshk.com.hk	Supplier
Intelligent Technologies Limited	毅智科技發展有限公司	2301 4868	info@intelligent-net.com	Supplier
J & J Network Engineering Company Limited	信卓網絡工程有限公司	3579 5263	www.jjnetwork.com.hk	Supplier
Jinchat Engineering (HK) Company Limited	正卓工程 (香港) 有限公司	2687 1755	jyin@jinchat.com	Supplier
Keio Engineering Company Limited	京王工程有限公司	2695 8872	www.keio.com.hk	Contracting
Kembla (Hong Kong) Limited	金特霸 (香港) 有限公司	2528 0999	www.kembla.com.hk	Supplier
Kin Wo A/C Engineering Limited	健和冷氣工程有限公司	2398 0157	kw@kinwo.com.hk	Contracting
Kinetics Noise Control (Asia) Limited	建力聲震控制 (亞洲) 有限公司	2191 2488	www.kineticsnoise.com	Manufacturing, Supplier
Kings View Airconditioning Engineering Co., Ltd.	景匯空調工程維修有限公司	2796 2417	admin@kingsview.com.hk	Contracting
Laser Resources (Asia) Company Limited	全美 (亞洲) 有限公司	2516 7500	laasiahh@netvigator.com	Manufacturing, Supplier
LeBlanc Water Treatment & Chemicals Limited	利邦化工水處理有限公司	2408 2000	www.leblanc.com.hk	Servicing
Lee Tack Engineering Company Limited	李德工程有限公司	2305 3111	ltec@leetack.com.hk	Contracting
Legend Engineering Company Limited	卓越聲控工程有限公司	2815 0928	info@legendjt.com.hk	Contracting, Manufacturing, Supplier
Lifa Air Limited	麗風空氣有限公司	2511 7076	www.lifa-air.com	Servicing, Supplier
Life Air IAQ Limited	活力空氣品質科技有限公司	3527 0106	winston@lifeairiaq.com	Manufacturing, Supplier
Link The Best Company Limited	必發 (香港) 有限公司	2568 4092	sales@linkthebest.com.hk	Supplier
Mason Industries (HK) Limited	梅森實業有限公司	2967 9639	www.mason-hk.com	Supplier
Mesan Fiberglass Engineering (International) Limited	明新玻璃纖維工程 (國際) 有限公司	2787 5717	www.mesanct.com	Manufacturing
Midea Electric (Hong Kong) Limited	美的電器(香港)有限公司	3669 4888	www.mideahk.com	Contracting, Manufacturing, Supplier
Mitsubishi Electric Ryoden Air-Conditioning & Visual Information Systems (Hong Kong) Limited	三菱電機菱電空調.影像設備 (香港) 有限公司	2510 1505	www.mitsubishi-ryoden.com.hk	Supplier
NAP Acoustics (Far East) Limited	NAP 聲學工程 (遠東) 有限公司	2866 2886	www.napacoustics.com.hk	Contracting, Manufacturing, Servicing, Supplier
New Way Engineering Company Limited	新法機械有限公司	2325 6892	www.newway.com.hk	Supplier
Oxprime (International) Limited	鑫輝 (國際) 有限公司	2590 8088	info@oxprime.com	Supplier
Pacific Sense Enterprises Limited	栢昇企業有限公司	3549 5372	www.pacificsense.com.hk	Contracting, Supplier
Peterson Engineering Limited	必德信工程有限公司	2365 0372	stso@peterson.com.hk	Contracting
Powers Technical Services Limited	寶華技術服務有限公司	2770 2110	powers.pts@gmail.com	Contracting
Practical Engineering (Hong Kong) Company Limited	百利高工程 (香港) 有限公司	2402 2772	practical@practical.hk	Contracting, Supplier
Pyrofoe Engineers Limited	衛安工程有限公司	2388 8038	www.pyrofoe.com.hk	Contracting
Ready Electrical Metal Work Limited	全達電器金屬製品有限公司	2898 8623	kw_leung@ready-group.com	Contracting, Manufacturing
REC Green Technologies Company Limited	盈電環保科技有限公司	2619 8817	www.yaulee.com	Servicing, Supplier
Regin Controls Hong Kong Limited	瑞晶溫控香港有限公司	2407 0281	henric.fong@regin.se	Supplier
Richmax Air-Conditioning Company Limited	萬聯空調有限公司	2698 3423	lawrence@richmaxltd.com.hk	Supplier
Sanby Trading Company Limited	聖備貿易有限公司	2573 4219	www.sanby.com	Supplier
Savills Engineering Limited	第一太平戴維斯設備工程有限公司	2534 1688	pwong@savills.com.hk	Contracting, Servicing
Shun Hing E & M Engineering Limited	順興機電工程有限公司	2387 2882	project@shunhingeng.com	Contracting, Supplier
Sing Kin Limited	陞建有限公司	2333 1518	singkin@gmail.com	Contracting
Smartech HVAC & Engineering Limited	智能空調工程有限公司	2521 9768	info@smartech-hvac.com.hk	Supplier
Southa Engineering Limited	南龍工程有限公司	2963 7241	www.southa.com	Contracting
Stars (Hong Kong) A/C & R Company Limited	恒星 (香港) 冷熱設備有限公司	6116 7832	stanley_yuen@hstars.com.cn	Manufacturing
Super Mark (H.K.) Engineering Company Limited	高達 (香港) 工程有限公司	2595 1122	www.supermark.com.hk	Contracting, Supplier
Superpower Pumping Engineering Company Limited	力霸水泵機械工程有限公司	2745 3562	www.sppump.com	Supplier
Sustainable Energy Limited	恆澤節能有限公司	2332 3077	www.sustaine.com.hk	Manufacturing, Servicing
Target Energy Solutions Limited	達標能源管理有限公司	2155 9882	www.targetensol.com	Servicing
Teembase Development Limited	天基發展有限公司	2554 6263	www.teembase.com	Supplier
Thermtech Building Products Limited	泛達建築材料有限公司	2756 3837	thermbpl@netvigator.com	Contracting, Supplier
Tinwood Pacific Limited	天匯太平洋有限公司	6325 1197	www.sinro.com	Manufacturing
Tom's Equipment Company Limited	義隆設備有限公司	2757 5539	tom@toms-equipment.com	Supplier
TROX Hong Kong Limited	妥思香港有限公司	2861 2261	www.troxapo.com	Supplier
United Controls Limited	統一儀器有限公司	2556 1001	www.ucl668.com	Servicing, Supplier
United Regent International Limited	友益國際有限公司	2527 8003	unitedregent@unitedregent.com	Manufacturing, Supplier
Union Manor Limited	聯明有限公司	2797 2168	www.luenming.com	Contracting
Victory Engineering Service Company Limited	維陞工程有限公司	2979 4068	pamela@ves.hk	Supplier
Viewco Building Services & Engineering Co., Ltd.	偉保工程有限公司	2543 0610	engineering@viewco.com.hk	Contracting
Wai Luen Air Conditioning Limited	偉聯空調設備有限公司	2890 9321	garychan@wailuenhk.com	Contracting
Wardson Engineering Limited	華順工程有限公司	2329 8268	wsengltd@yahoo.com.hk	Contracting
Wing Shing Air-Flow Company Limited	永盛風咀製品廠有限公司	2792 6331	contact@wingshing-hvac.com	Manufacturing, Supplier
Wolter Asia Limited	華德亞洲有限公司	2456 0198	info@wolter.com.hk	Manufacturing, Supplier
Wysermann Company Limited	威士文有限公司	2614 2213	wysermann@wysermann.com.hk	Manufacturing, Supplier
Yin On Trading Limited	賢安建材貿易有限公司	2572 7110	office@yinon.com.hk	Supplier
Yordland Engineering Limited	日島工程有限公司	2362 2186	www.yordland.com	Contracting, Servicing, Supplier
York Choi Industrial Limited	旭彩實業有限公司	2795 8286	www.yorkchoi.com	Manufacturing
Zion Engineering Limited	錫安工程有限公司	3481 6007	kennycmwong@gmail.com	Contracting, Supplier

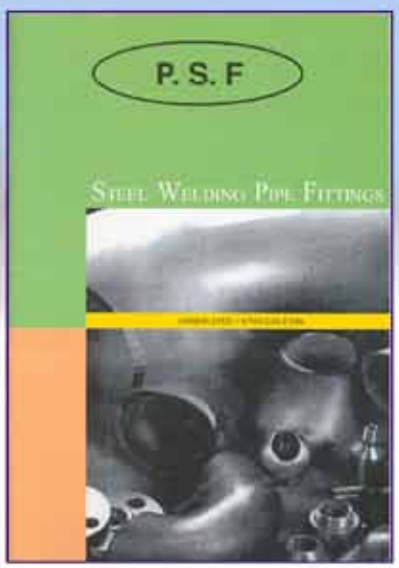


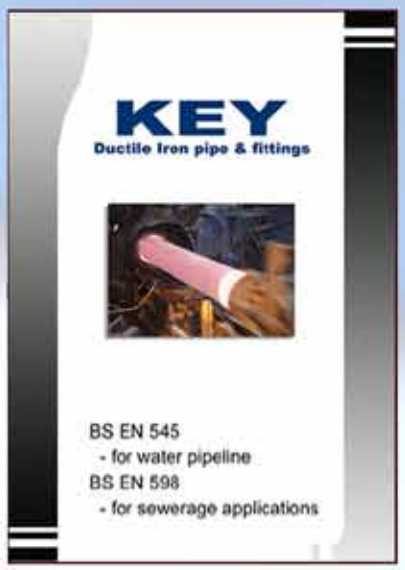












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