香港空調及冷凍商會有限公司
THE HONG KONG AIR CONDITIONING AND REFRIGERATION ASSOCIATION LIMITED
SUMMER 2021 NEWSLETTER 會員通訊

10 years+ 同心展關懷 caringorganisation

Contents

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Ir Franklin Lau
President

Message from the President

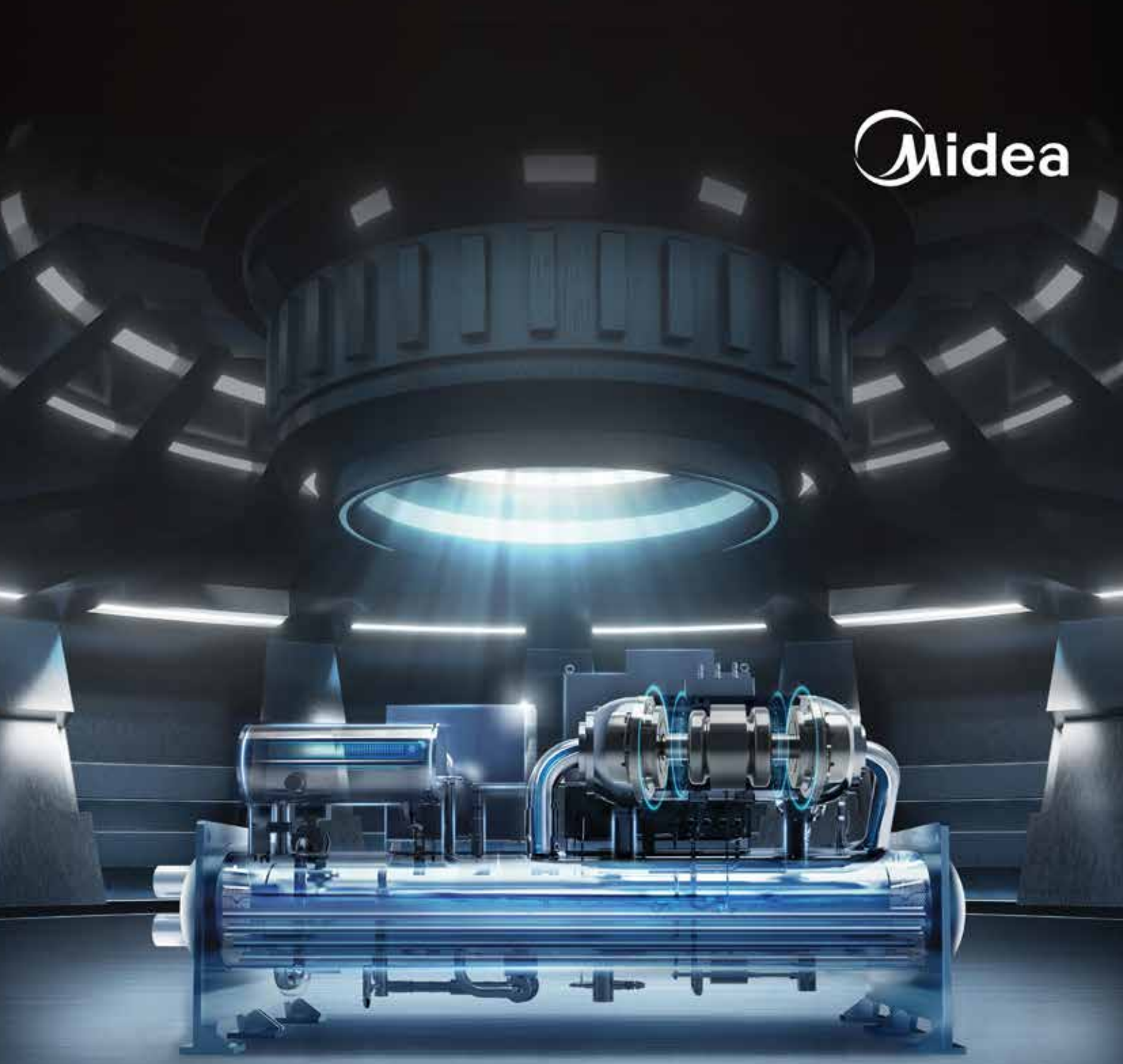
Stepping into the second year of my term as the President of ACRA, I would like to express my sincere gratitude to our members for their continuous support. Even though most of the in-person events and meetings were canceled due to COVID-19 and the subsequent social distancing measures, we were able to adapt to the norm with the aid of virtual meeting/event platforms and the dedication of our council members, committee members, and administrative officer.

During this challenging period, protecting ourselves from the coronavirus is of utmost importance. To prevent further outbreaks and achieve herd immunity, I encourage our members to get vaccinated if health conditions allow. With the ample vaccine supply in Hong Kong, we can work together to fight against the virus and prevent construction projects from suspension.

In view of the impacts to construction workers brought by the epidemic, we appealed for two donations going toward the Construction Industry Caring Campaign organized by the Construction Industry Council (CIC). The Campaign provides monetary assistance and caring support to workers placed in compulsory quarantine, workers infected with COVID-19, and immediate family of deceased workers infected with COVID-19. We are grateful for the invaluable support from our members to help relieve the pressure on our frontline workers.

A growing number of construction works is foreseeable in the coming years as over $200 billion budget had already been approved by the Legislative Council for various infrastructure and building projects. It is our responsibility to maintain the quality and safety matters of every project regardless of the related amount. It has come to our concern that the industry accident rate remains high. In May 2021, the year-to-date number of reportable fatal cases is 15, which is very close to the total fatal cases of 18 throughout last year. Although our association is against the proposal for raising penalties of Occupational Safety and Health Legislation, we should never sacrifice safety under any circumstances. Being a part of the industry, all members should put safety issues as the top priority and raise the awareness among their colleagues to improve this unsatisfying situation.

.....(To be continued on page 3)



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MESSAGE FROM THE PRESIDENT

.....From cover page

This year, we worked with Hong Kong Green Building Council (HKGBC) to set the assessment criteria for several types of equipment under the CIC Green Product Certification Scheme. The Scheme provides a standard assessment for industry participants to get recognition for their environmental-friendly building operation products. Members are strongly encouraged to seize this opportunity to participate in the Pilot Scheme as HKGBC is currently offering exemption on the assessment fee.

Design for Manufacturing and Assembly (DfMA) and MultiTrade integrated MEP (MiMEP) have become the buzzwords appearing in the construction industry in recent times. CIC and HKFEMC co-organized the DfMA MiMEP Tradeshow 2021 in March to showcase the applicable capabilities of the industry. The Tradeshow also provided a platform for different companies and professionals to share their experiences as well as exchanging ideas in the aspects of DfMA and MiMEP. At the launch ceremony on 2 March, Ir Lam Sai Hung from Development Bureau officially adopt the acronym MiMEP for the Hong Kong construction industry. Since the construction labor shortage has been an issue in Hong Kong for years, the adoption of these new approaches would be able to reduce the reliance on labor, enhance site coordination and improve the quality of the projects. In addition, as the application of the DfMA and MiMEP requires procurement at the early stages, ACRA will work with HKFEMC to propose new general specifications for the payment schedule. In the meantime, the wide adoption of MiMEP also requires all parties to employ BIM and digitalization at early stages in which can be supported by providing BIM models or logistic information to the clients.

For the internal activities, although we did not host the Spring Dinner this year due to the pandemic, we still had a great time with our members during the Chinese New Year. We enjoyed paying virtual New Year's visits to each other and participating in the online beer drinking competition. As the competition has always been one of the most exciting highlights of the Spring Dinner, we were thrilled to see it being held successfully despite the cancellation of the dinner. I would like to send my special thanks to the Young Member Committee for making all of these virtual events to come true.

To celebrate the 60th anniversary of the establishment of ACRA this year, we have planned numerous activities such as the photo contest, eSport competition, and AR technical visit. The series of events will culminate with the significant annual dinner in November 2021. Provided that COVID-19 is getting under control, it is anticipated that we would be able to proceed with these plans as scheduled. Wish you all good health and I look forward to seeing you in person soon!

Management of Prevention Against Infection of COVID-19

By ***Daniel W.T. Chan. B.Sc., M. Phil., Ph.D.***

Introduction

This paper introduces the approach of managing risk against COVID-19 airborne transmission in indoor space by the air-conditioning engineers. Since COVID-19 has become a pandemic in 2020 and the airborne transmission route becomes dominating in the consensus of the scientific community, too much attention and resources has been put into air disinfection. Unfortunately most of the effort is in vain because it is very difficult to quantify the effectiveness of such hardware. This paper recapitulates the importance of risk management of the transmission by building professionals. A Reproductive Number (R) is adopted as a risk criterion, calculated from other evidenced-oriented values of dependent parameters and sub-models. This risk management approach can quantify and visualize the effectiveness of protection protocols, interpret the impact of air change rate and make protection policy more resilient. If COVID-19 becomes an endemic disease and that the prevention is a routine, the risk management protocol will become the 'New Normal'.

Influenza and Coronavirus Outbreaks in Hong Kong

1968 – Hong Kong Flu. Mortality was between 0.2 – 0.5%.

1997 – Avian flu, 6 people died. 130 millions chickens were slaughtered and a monthly market cleansing day was introduced.

2003 SARS – 1755 confirmed cases and 299 people died in Hong Kong. Mortality was 17%. The first case was discovered on the 24th February in 2003. All infected patients were isolated. On the 24th June 2003, WHO announced that Hong Kong was no longer an epidemic-stricken city.

2009 Swine flu – on the 25th November 2009, 32,301 cases had been confirmed and 15 died. The mortality is estimated between 0.1% to 1.1% from young to old.

End 2019 to present – COVID-19 has plagued the world with an average mortality rate of ~2%. The world's economy is forced to almost a total halt in 2020. Vaccine is available in the second quarter of 2021. However, there remains much debate about the different types of vaccines.

What next?

COVID-19 reveals a few important issues:

1. COVID (coronavirus disease) is likely to become an endemic disease in the world.
2. Hong Kong people in general have very good hygiene practices. Most citizens wear masks, sterilize hands and places.
3. Rate of vaccination is not satisfactory for herd immunity.

Even though the facility management has a high standard in both technology and practice, the building professionals have the highest pressure in history fighting against indoor infection outbreaks, not to mention about the zero carbon emission commitment, sustainability, smart city, ESG requirements, etc.

Health and Life Risk Indoor

Indoor air quality (IAQ) has been the talk of the town in the beginning of 1990s when the concept of Healthy Building was introduced into the building services engineering sector. In general, poor IAQ may cause chronic health problems. However, unlike common flu, the current COVID disease is more infectious and could be acute and fatal. COVID

prevention cannot be achieved simply with the IAQ technologies. A new approach should be adopted. This paper proposes a Risk Management Protocol.

Brief Review of the Air Disinfection Technologies

1. Two ways of air disinfection
   i. Hunting – disinfectants in gaseous or aerosol form are released to the indoor air. These agents distributed in the air 'hunt' the virus in air. The agents are much diluted in air. The effectiveness is very difficult to test and doubtful.|
   ii. Fishing – the machine has a fan to circulate air through its disinfection chamber. Similar to fishes which are streamed through a point for fishing, if the principle of disinfection is useful and the design is correct, air disinfection inside the chamber can be very effective. The performance is usually rated by the Clean Air Delivery Rate standard.

2. Technologies
   i. HEPA filters - This type of high efficiency filter is now cost-effectively available since the breakthrough of the technology in producing the filter media. The dilemma is that the filters collect all the virus in air and thus impose danger to the maintenance personnels. It is important to see if the HEPA filters come with some other disinfection technologies which can continuously kill the virus on the filter media.
   ii. Ultra-violet lights – it is a proven technology for disinfection. However, the frequency, the strength and the retention time have to be specified for the purpose.
   iii. Plasma – the technology is easily confused with ionization and ESP (electro-static precipitator). With a true plasma field, the disinfection can be very effective.
   iv. NCCO – Nano Confined Catalytic Oxidation. This is a local technology developed by the University of Science and Technology.
   v. Gaseous or aerosol mist – usually chlorine dioxide based or herbal extracts.

3. Factors to note
   i. Strength of the energy field produced by the technology.
   ii. Disinfection zone coverage.
   iii. Retention time.
   iv. Hunting or fishing process.
   v. Energy.
   vi. Replacement requirement.
   vii. Interaction with the ventilation of the covered zone.
   viii. Clean Air Delivery Rate (CADR).

Do we know how to quantify the protection effectiveness of using this kind of air disinfection?

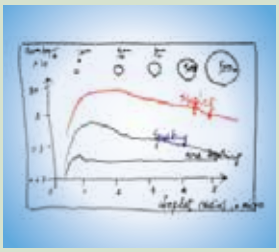
Immunizing a Building

Every time when an endemic disease outbreaks, people normally overreact to the purchase of air cleaners without actually realizing the suitable selection and application. The attitude is a kind of "has done something.

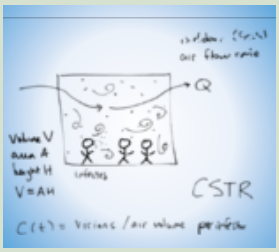
Also, it is an usual notion that COVID virus is transmitted by droplets. So, social distancing of 1 to 2 meters is taken as an essential protection. However, the "restaurant cluster" occurring at the end of this February triggers the FEHD (Food and Environmental Hygiene Department) requirement of 6 air changes in restaurants. The protection procedure reverts to the golden rule of "Solution to Pollution is by Dilution". However, it leaves the same question as air disinfection: Can we quantify the effectiveness against COVID infection by a higher air change rate? The quantification process is proposed to be a risk management criterion.

The Anti-COVID Management Model

An Anti-COVID criterion can be derived from the understanding and integration of the following sub-models



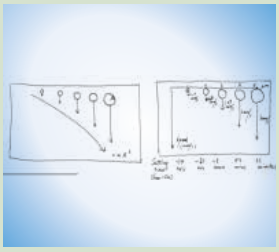
Activity Sub-model
Speaking, loud talking, and singing can generate a large number of aerosols, tens or hundreds times more than normal breathing with nose only. Higher aerosol concentration exhaled by an infected person induces higher risk to infect the susceptible others, where the risk could be encapsulated by the pathological quantity called "infection quanta".



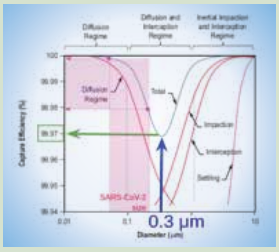
Infection Sub-Model
The personal risk of infection can be estimated by the infection quanta concentration of the virus and the ventilation rate.

Breathing Rate Sub-model
The breathing rates vary with the body activities. Exercising provokes deep and heavy breathing for example. Such rates affect the amount of aerosols both exhaled (by the infected person) and inhaled by the susceptible others.

Face Mask Sub-Model
Mask wearing with a good mask fit is a very effective protection measure, as this ensures double protection of the infected person and the susceptible others.
Very often, ventilation could be optimally reduced by enforcing people wearing masks during the whole period of their stay without compromising safety level against the transmission risk.



Aerosol Transmission Sub-model
All droplets and aerosols emitted into indoor space and settling onto surfaces follow the aerodynamic principles. The smaller the aerosol droplet in size, the longer it would stay in the air, plus the larger the infectivity of the virus would be.



Filter Sub-Model
It helps to remove aerosols of virus particles. The recirculated air would contain less virus, and would be almost virus-free by using true HEPA filters.

Size of Space and Number of People Sub-model
Size of space and number of people affect the air change rate and social distancing.

Air Cleaner Sub-Model
An effective air cleaner or system removes or inactivates the virus particles. The recirculated air is not fresh air. Virus free air can be considered as an effective ventilation rate for anti-COVID protection.

Duration of Stay Sub-model
The longer the stay inside a space with an asymptomatic patient, the higher the risk of infection.

Bazant et al. derive a model for the determination of a risk criterion based on some of the sub-models highlighted above. The risk factor proposed is indoor reproductive number (Rin). It is similar to the basic reproductive number (R0) used in epidemiology to indicate the severeness of the pandemic. By the same token, Rin is the average number of susceptible people who get transmitted by one already infected person in the indoor circumstance. Bazant's model is basically a zone model. In situations where the air and aerosols are not well mixed, engineers can adjust the predicted result with the concept of ventilation effectiveness.

An Anti-COVID Risk Management Protocol (ACM)

Step 1. Sensors collect data as required by the risk model. IoT technology ascertains the feasibility of data acquisition.

Step 2. The analysis models the Rin and ventilation rate in real time. A dashboard can be constructed to highly visualize the indoor risk, activity, indoor environmental conditions and ventilation performance.

Step 3. Protection against infection consumes extra energy. This protocol optimises resources, such as energy for an agreeable Rin, rendering feasible quantification of the protection effectiveness. Then, the building developer has a direction to budget a safe building, facility management knows what to do, and building users are protected.

The Way Forward

With new approach, risk and protection can be quantified, digitized and visualized making the risk management cost justifiable, operable and maintainable. For any indoor environment with its planned business function and ventilation, Rin can be estimated for its safety level. Alternatively, at an agreeable Rin, the model can convert any resources requirement such as ventilation rate, people stream, and duration of stay, etc. Hence, business operations will be more resilient in environmental, social, and governance aspects against infection risk.

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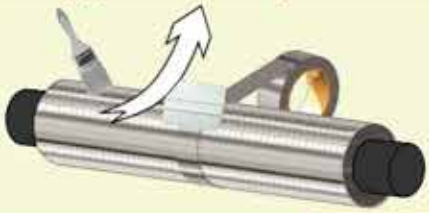

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Year of Completion : 2007

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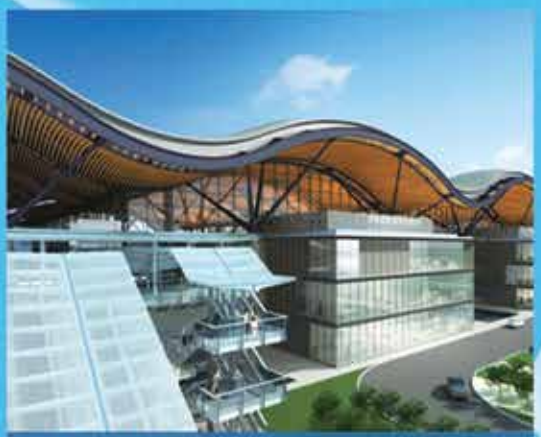

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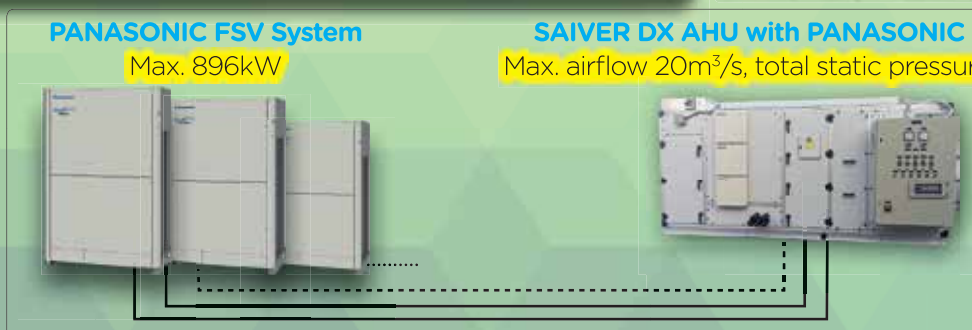

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Yue Man Square

Project Name	: N.K.I.L. 6514, Kwun Tong Town Centre (Development Areas 2 & 3)
Member's Role in the Project	: Mechanical Ventilation and Air-conditioning Installation to Podium
Completion Year	: 2020
Member/ Company Name	: Takasago Thermal Engineering (Hong Kong) Co., Ltd.

Project Overview

As one of the key redevelopments of the Urban Renewal Authority's Kwun Tong Town Centre Project, Yue Man Square (YM2) is the podium that includes a 3-storeys shopping arcade with carpark, public transport interchange and a refuse collection point under the residential premises "Grand Central (Phase 1)" offering one-stop leisure, entertainment and dining experiences in the district to enhance the quality of life for the residents and visitors. . .

It is not difficult to find innovative and smart features from the YM2 Public Transport Interchange especially the first indoor air-conditioned bus waiting area in Hong Kong as well as the installed locally-developed air induction units at minibus terminus and the AI sensor-controlled boarding gate system, etc.

In addition, since there were a range of shops originated from the former Yue Man Square, YM2 is currently built-in with a "Yue Man Lane" on 1/F and a "Yue Man Hawker Bazaar" on B1/F where the former operators can resume their businesses in these tailored zones to inherit the unique culture, warmth and friendliness of Kwun Tong.

MVAC System Description

The main chiller plant of Yue Man Square consisting of 3 nos. of 2,110kW & 1 no. of 609kW fresh water-cooled tri-rotor screw chillers is located on B2/F. Moreover, YM2 embraces one of the largest indoor fresh water cooling tower plant which consists of 3 nos. of 2,638kW (heat rejection) and 1 no. of 761kW (heat rejection) CTI certified cross-flow type cooling towers located on 2/F. In order to meet the acoustic requirements, air intake silencers are installed inside the cooling tower plant room, and other series of silencers are connected to cooling towers by air ducts as the discharge air paths to external areas. Consequently, all cooling towers are equipped with centrifugal discharge fans to cater for such relatively higher air pressure requirements.

Generally, majority of the shopping mall areas including the bus waiting area are served by fan coil system with pre-treated fresh air from PAUs located on UG/F and 2/F while 5 nos. of AHUs are installed to serve for the main entrances, lobbies and atrium.

Individual mechanical systems with fresh air supplied at low level and exhaust air inlets at high level are operated to serve the bus terminal on 1/F and public minibus terminal on G/F respectively.

For further enhancement of the ventilation performance of the public minibus terminal, additional oscillating fans are planned to be installed at all minibus waiting areas.

Meanwhile, other E&M plantrooms are provided with mechanical ventilation systems whereas ventilation for the commercial carpark is mainly supplied by jet fans scattered over the carpark areas on B2/F.

For air quality and hygienic purpose, in-duct UV-C sterilization systems are provided for Hawker Bazaar and Refuse Collection Point whilst the 24-hour operated air-conditioned corridors linking to Hong Ning Road, Mut Wah Street and Hip Wo Street are supported by a series of fan coil units.

Last but not least with regard to the subject of fire safety, separate VAC Control System is provided to trip the related air ventilating equipment serving for Yue Man Square in the event of any fire case is detected. Method "C" as per the FSD's requirements is adopted for the VAC Control System and the automatic tripping action will be triggered by the fire alarm cut-out signal provided by the Automatic Fire Alarm Panel at the G/F FS Control Room.

人物專訪

梁永泰先生（Victor Leung）

本會非常榮幸邀請到業內知名工程師梁永泰先生（Victor Leung）撥冗接受訪問。

在訪問的開端，梁先生笑言自己的求學時期略顯平淡，但有時生活愈見平淡無奇，卻可專注慎重、全心投入學業。梁先生以優異的成績於香港大學機械工程系以一級榮譽畢業後，其後再攻讀M.B.A.碩士課程。問到梁先生為何加入工程界，他戲言：「當時其實並沒有明確生涯規劃或目標，資訊亦不如現時流通，唯一比較著迷砌模型，於是決定就讀機械工程。」梁先生在畢業後任職於顧問公司和則樓，兩三年後逐漸了解到自己的喜好，於是矢志全身心投入屋宇裝備行業。於2008至2009年度，梁先生更擔任英國屋宇裝備工程師學會香港分會主席。多年來，他為工程界作出的傑出貢獻，成績更是有目共睹。

全情投入　孜孜不倦

梁先生專業不局限於冷氣系統，他在四十多年的工程生涯中，於澧信工程顧問有限公司（J.Roger Preston Limited）工作長達廿七年，其涉獵項目類型甚廣，由工廠大廈、酒店、醫院，以至國際金融中心二期及香港特別行政區政府總部，都一一經梁先生主理。於希慎服務時（Hysan Development Company Limited），梁先生從保養和維修角度考慮能源效益，提出多個節能方案，　每年為其節省高達千萬元的電費開支。梁先生其後成立了　Victor　Leung　& Associates　Ltd，繼續為屋宇設備業界提供專業技術意見，當中包括為香港會議展覽中心和酒店改善冷氣散熱系統以及提高冷凍倉的能源效益等。

從談話過程中感覺到梁先生不僅是一個以「目標為本」的實務型工程師，同時他亦十分心思細密，顧慮周詳。他舉例，曾經有客戶希望為一座工業大廈翻新，建築師及機電顧問建議安裝樓梯加壓系統。梁先生站在業主角度作以下評論「安裝樓梯加壓系統應該仔細考慮，因為安裝完成後，還需要定期維護檢查才能確保理想運作，若然不足，可能會因為系統不能理想地運作，以致阻礙用戶逃生，例如難以推開防火門。因此，考慮安裝這類系統時，應該將維護系統的法律責任告訴業主，讓他考慮是否願意承擔這法律責任，評估自己是否有能力承擔系統維護。」

破舊立新　與時俱進

梁先生面對日新月異的工程界發展，他同意BIM在設計、施工、維修和保養這些方面都有不同程度的幫助。但認為「適度」地使用BIM所帶來的效益更大，例如先考慮應用於較複雜的機房、密集的管線通道。自認三度空間思為能力不俗的他，過去亦曾難以應付國際金融中心二期隔火層機房裏錯綜複雜的建築結構，需要參考結構立體模型才能進行其中的機電設計，他相信BIM這項技術可以幫助設計師的三度空間思維，減少建築過程中不同行業的碰撞。宣傳BIM方面，梁先生亦倡議推廣BIM時應努力讓建築行業看見使用這技術的經濟利益，而不是單靠建築合約條款迫使承建商採用這技術，他認為「人材」亦是一大重要配套，唯有「人材」具備正確的知識和心態，由設計、建造到保養階段都善用BIM，才能使這工具發揮最大的成本效益。

展望未來　寄語年輕人

梁先生坦言：「對我而言，香港其實已經步入為一座成熟發展的城市，難以期望再有大量的新建設，我們將焦點從新建設轉移到現有樓宇的運作維修，屋宇設備人材應學習如何「善用」擁有先進機電設施的高樓大廈。」

「盡自己的責任，去建立別人的信心。」這是梁先生在工程界工作多年的信念，也是他對年輕一代的工程師的寄望。梁先生用自身的經歷作為例子，在設計國際金融中心二期的樓梯加壓系統時，曾經連續多日，上午八時就到消防局前守株待兔，嘗試與消防官會面。在僅僅二十分鐘時間內，由煙囪效應等理論，探討至實際應用，目的就是為了讓消防官理解設計理念，並且聽取消防官的意見。憑藉著梁先生的誠意和盡責的態度，消防官逐漸建立起對他以及這項工程的信心，梁先生表示他對待業主、建築師、結構顧問、承建商也是採用同樣原則：「以誠待人」。梁先生　表示完成一項工程的關鍵往往不在於技術，而在於「盡心、盡責」。

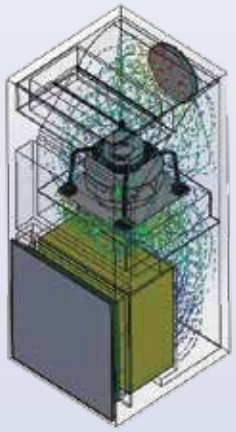
Update of Air Purification Technology Against Covid-19 Transmission

Increasing indoor air changes to reduce infection risk is promoted by most of international professional organizations (public health, engineering, building etc.), while the accumulation of evidence on short range airborne transmission of Covid-19 is still on-going. Their suggestions also highlight that when the air dilution option is not possible, the air filtration or germicide option may be pursued as the alternative. In summary, augmentation of fresh air provision through air change or infection control by air filtration or germicide option would help reduce the risk of short range airborne transmission of Covid-19. Three type of air purifiers (HEPA, UV-C and HEPA cum UV-C) are recommended by US CDC and ASHRAE to reduce the spread of and lower the risk of exposure to COVID-19. The two technologies are updated as following :

A. High-Efficiency Particulate Arrestance (HEPA) Fan

HEPA fan devices are one of the quickest and economical solutions to improve IAQ without costly design changes to the HVAC system. Typical HEPA fan devices in the market would consist of the following:

- HEPA Filter – class H13 or above to capture at least 99.97% of microscopic particles 0.3 microns in size
- EC Fan – Highly efficient fan with Electronically Commutated Motor that is higher that IE4 efficiency



Below examples are how different industry uses HEPA fan devices to achieve better IAQ or to meet more stringent requirement due to Covid-19 concerns.

At the beginning of the Covid-19 pandemic, the confirmed cases surges with Covid-19 patients require hospitalization and isolation. The isolation rooms across the public hospital system are overflowed due to excess demand. The Hospital Authority decided to convert general wards into 2nd tier isolation rooms to admit patients in stable conditions. They HEPA fan devices were instrumental in these conversions.

The Food and Environmental Hygiene Department provided guidelines to meet the air change requirement for dine-in catering premises. Ideally it would be best to increase the air change by increasing the fresh air into the premises. However, this would usually require an entire upgrade of the ventilating system such as ductwork, fresh air inlet enlargement, increase fan and motor size, etc. This would be quite costly for most restaurants operated by SME. An alternative would be the use of HEPA Fan Devices to increase the air recirculation with filtration.

Facility management would use HEPA fan devices to function as a recirculating HEPA air cleaner by reducing airborne pathogen counts. They are typically using these devices to increase air circulation if existing ventilation is poor such as lobby, waiting area, office, meeting room, etc.

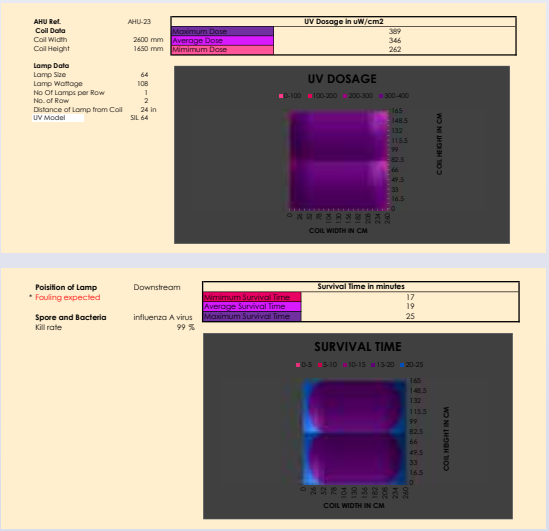
B. Ultraviolet-C (UV-C)

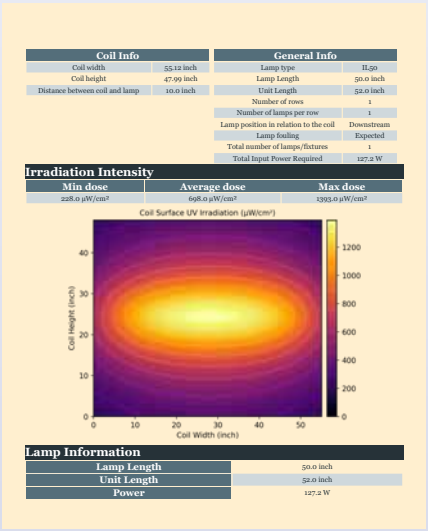
Ultraviolet (UV) has been used as a tool for disinfection quite a long time. Main commercial applications are disinfection of air, water and surface. The effective UV spectrum for germicidal purpose is the UV-C range (wavelength of 100-280nm. The optimal wavelength for germicidal effect is 253.7 nm and this is the typical UV-C that is available in the market.

For the HVAC industry, one of the application is using UV for disinfection of coil surface to promote better indoor air quality. The cooling coils inside the AHU typically provide perfect conditions for mould and bacteria growth due to the humidity. The installation of UV inside the AHU would help to reduce mould and bacteria growth. There are a few items to consider for the UV installation:

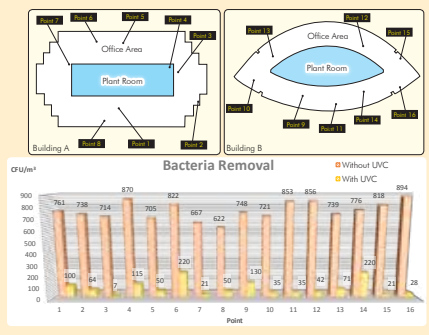
- Location – downstream of the coil to avoid destroying bag filters
- UV dose – amount of UV needed to kill certain bacteria
- Reflector should be used to maximize UV exposure on the coil

There are commercial software in the market that can determine number of UV needed for installation.





Some studies have been done to determine effect of UV installation inside AHU and it's found bacteria count are reduced over 95%.



Swab Test (Coil Surface) (CFU/plate)		Bacteria removal
Without UVC	With UVC	%
151	7	95.40%
165	7	95.80%
171	7	95.90%
181	7	96.10%

In conclusion, installation of UV inside the AHU help to reduce bacteria growth on cooling coils. It can be part of the HVAC system to provide better indoor air quality.

Permanent Magnet Motor

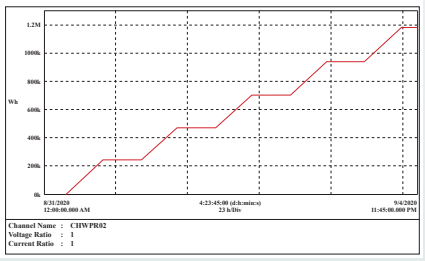
By: **Mr. Ronson Cheng**

There are squirrel cage induction motor and permanent magnet motor in the market. The main difference between the machine design of them is on the rotor. There are some aluminum bars in the rotor of induction motor which will circulate a current generated by magnetic field induced by the stator. The current circulation in rotor generates Joule losses and heat.

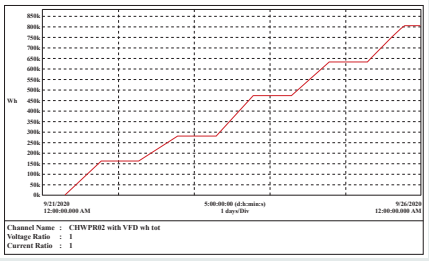
For permanent magnet motor (PM motor), it is driven by a variable frequency drive designed for industrial purpose; the aluminum bars are replaced by permanent magnets in rotor of PM motor to provide motor flux and eliminate heat generated by the circulated current. The permanent magnets are made of rare earth materials which have advantages in lower weight and volume with 18 times stronger in strength than ferrite and resistance to high temperature. The PM motor can be run at any speed without a forced cooling fan. Moreover, it has higher efficiency at all speed range. The efficiency class defined by IEC 60034-30-1 states the higher the class number, the higher the motor efficiency (i.e. IE2 is more efficient than IE1). The PM motor is available in IE4 and IE5.

Case Study - Replacement of 4 sets of 75kW PM Motor for Chilled Water Pump

To compare the energy consumption of PM motor and induction motor, field measurements were carried out before and after the replacement of four nos. of 75kW motor in a chilled water pump system. The old induction motors have efficiency class of IE2 at 1,480 r.p.m., while the new PM motors have efficiency class of IE4 at 1,000 r.p.m. The actual daily operating schedule of the chilled water pump or motor is from 7:00 to 18:00 and the total energy consumption of two types of motors (from Monday 0:00 to Friday 24:00) were logged as follows:



KWh logging from 31st August 00:00 to 4th September 12:00. Other periods are at stall.



KWh logging from 21st August 00:00 to 26th September 12:00. Other periods are at stall.

	Induction Motor	PM Motor
Energy Consumption / 5 days in a week (KWH)	1,180	803
Projected Energy Consumption / Year (KWH)	61,360	41,756
Electricity Charge / Year* (HK$)	73,632	50,107
Saving in Electricity Charge Per Annum in Comparison with Induction Motor and Permanent Magnet Motor (HK$)	23,525	
Energy Saving Per Year in Comparison with Induction motor a nd Permanent Magnet Motor (%)	31.9%	
*Assume daily operating hours from 07:00 to 19:00, 5 working days / week; 52 weeks /per year and electricity tariff is HK$1.2/kWh		

Way Forward

To achieve carbon neutrality in Hong Kong by 2050, the application of higher efficiency equipment is one of the considerations. The permanent magnet synchronous motor has the advantages in higher efficiency in wide speed range, lower weight and frame size, lower noise and vibration; extended bearing life and needless for forced ventilation. Its year-round energy consumption is around 70% of the conventional induction motor.

Replacement of PM motor is simple both in direct drive type and belt-driven type AHU. However, special attention is drawn for application in chilled water pump on the adaption of the coupler as the motor frame size is reduced.

75KW Permanent Magnet Motor, IE4

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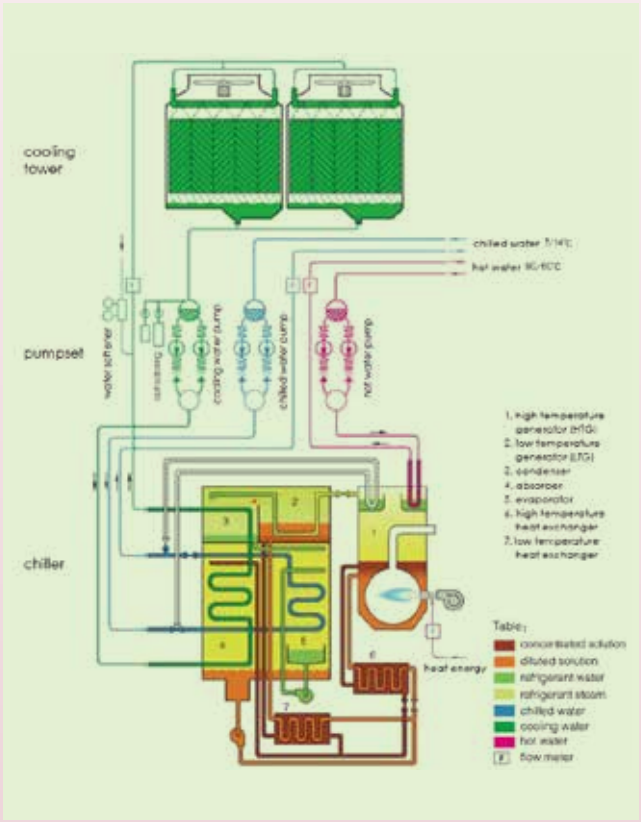
Application of Gas Absorption Chiller in Hong Kong

Preface

Unlike conventional chillers, absorption chiller makes use of gas, a relatively clean energy with lower energy cost, to drive a thermodynamic process that allows water to be chilled and distributed for HVAC needs. Absorption chiller has the advantage of eco-friendly as it does not use CFC nor HCFC refrigerant. Instead, it uses Lithium Bromide (LiBr) solution as a media to complete the cooling process, which would not impact global warming nor ozone depletion. It is the most common application for industrial manufacturing facilities to reduce peak electricity demand, while there is also significant opportunity for other settings such as theme parks and data centers to benefit from installing an absorption chiller.

Cooling Principle of Absorption Chiller



An absorption chiller normally has a condenser, a generator, an evaporator, an absorber, and a heat exchanger. First, LiBr solution is stored in high temperature generator and heated by burner to the temperature of at least 140°C, the water molecule inside LiBr solution would be vaporized. Then, it would be condensed by cooling water to become the "refrigerant water", which is a zero greenhouse gas ("GHG") value of refrigerant. Different from the traditional refrigerant coolant, such as CFC & HCFC, it will not damage ozone layer and intensify global warming effect. The refrigerant water would be transmitted to high vacuum room and sprayed over copper tubes. As the evaporated temperature in high vacuum room is 5°C, the refrigerant water would absorb a lot of energy from chilled water in copper tube. Therefore, the chilled water can be dropped down from 12°C to 7°C. The concentrated LiBr solution would be pumped between evaporation room and generator to complete the cycle of cooling process, i.e. absorb vaporized refrigerant water and heated to produce water vapor.

Absorption Chiller in Ocean Park

Fulfillment of Carbon Reduction Targets:

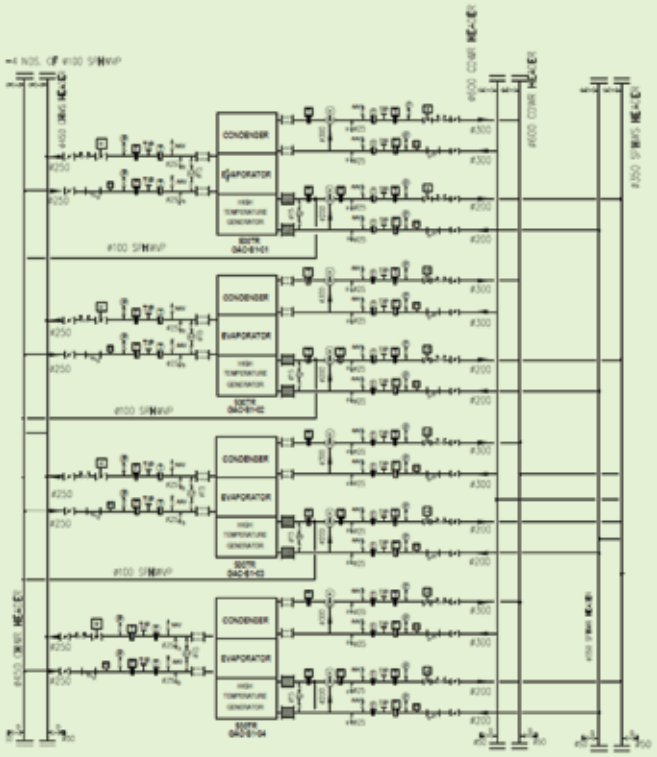
Ocean Park is well recognized as an eco-friendly corporation, with environmental practice and low carbon emission targets. Working towards the goal, the park has commenced to replace their aged electrical chillers to town gas absorption chillers for their existing attractions since 2014. Totally 6 nos. of absorption chillers were installed in various facilities including Shark Mystique, Adventures in Australia and Ocean Theatre. The total cooling load capacity reaches approx. 1,000RT.

Importance of Temperature Control in Animal Exhibits:

Ocean park aims to provide a comfortable and safe environment to the animals. Depending on the nature of the facilities, absorption chillers are used to provide chilled water and hot water to the central air conditioning system and Life Support System (LSS). Marine mammals and fish are rather sensitive to the pool temperature. They would get sick or even die if the temperature of their habitats is inappropriate for their living. In Ocean Theatre, 2 nos. of 330RT absorption chillers were used to generate chilled water to maintain a constant pool temperature environment for dolphins and sea lions. Besides, using gas type absorption chiller can alleviate the impact of sudden suspension of electricity supply and thus enhances the overall stability of the system.

Absorption Chiller in Water World Ocean Park:

Water World, Asia's first all-weather, year-round seaview water park, targets to be opened in the summer time of 2021. Featuring 27 indoor and outdoor water attractions, the water park will include a man-made beach, a surf rider, and an eight-lane mat racer water slide. To achieve all-weather operation, 4 nos. of 500RT town gas absorption chillers were installed to provide chilled water and space heating water for all indoor pools and office areas.



Water World is the first project site in Hong Kong which applied the technology of "Condensing Heat Recovery" inside the gas absorption chiller. Those chillers can be operated in "Cooling Mode" and "Heating Mode" simultaneously. The by-product of condensed water generated from the heating water inside the High Temperature Generator (HTG) will be recycled as refrigerant for the cooling purpose which can lead to enhancement of overall system efficiency. In addition, operators are able to have 24/7/365 real-time remote monitoring to the operation performance of the chiller unit by portable mobile devices at anywhere anytime.

Cooling Capacity	: @1,745kW
Chilled Water Temp.	: 12°C / 7°C
Heating Capacity	: @1,883kW
Heating Water Temp.	: 37°C / 45°C

Absorption Chiller in TKO Data Center

Making Use of Waste Energy:

Methane gas is a by-product of landfills, which contributes to the greenhouse effect and accelerates climate change. Fortunately, methane can be captured and used to drive absorption chillers instead of being flared off.

In order to promote the application of renewable energy, a landfill gas treatment plant is constructed in South East New Territories (SENT) Landfill that utilizes advanced technology to convert landfill gas into synthetic natural gas. The treated gas can be used as fuel in gas production, turning waste to energy.

Importance of Cooling System in Data Center:

A Data Center is located in the adjacent industrial area in Tseung Kwan O, which has an area of about 22,000m2 and accommodated 3,000 drive cabinets. Although servers have their own internal cooling mechanisms, adequate and reliable cooling is indispensable to the operation of data center industry to eliminate the risk of overheating from servers and other sensitive electronics.

The First Chiller System directly using Renewable Energy:

By installing an 800RT landfill gas-type absorption chiller, the system operates 24/7 for producing chilled water to user's data halls. In typical chiller system, refrigerant compressor consumes the largest amount of electricity. However, in this case, not only does the application of absorption chiller saves electricity cost, the lack of compressors in the machine significantly reduce the noise and vibration, providing a quiet environment with high reliability. The solution also helps ease global warming by reducing 9,300 tons of carbon emission thus far, which is equivalent to planting 400,000 nos. of trees.

Award Winning Green Application

Utilizing gas or renewable energy as fuel, the direct-fired absorption chiller provides three functions including cooling, heating and hot water in one system, which substantially enhances efficiency and reduces equipment investment. Early in 2016, the application was awarded as the Silver rating under Chiller category of the Hong Kong Green Building Council (HKGBC)'s Green Product Accreditation and Standards (HK G-PASS) to recognize the greenness of the product.

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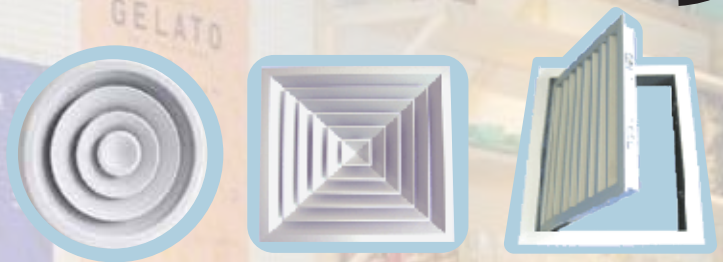

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香港 - 慈山寺, 海洋公園, 灣仔君悅酒店, 柏寧酒店, 何文田、杏花村和長沙灣地鐵站, 荃灣車廠, 美心食品廠, 沙田馬場, 北角馬會投注站, 太古廣場2/F&3/F Mall（金鐘道）, 香港眼科醫院...
澳門 - 威尼斯人, 銀河, 金沙, 永利, 新濠天地, 新葡京, 下環街市 ...

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DDS STAINLESS STEEL ELECTRIC HEATING ELEMENT

FCU Heater Box

AHU / PAU
Heater Box

- **Heater**
- **Heater Box**
- **304 stainless steel tube and fin material**
- **Black heat type**
- **Country of origin - PRC**

Job Reference :
HK - HKU, OpenU, Diocesan Girl's School, HKJC, HK museum of art, HZM Bridge, Gleneagle, Hysan Place, Ocean Park Kaola project, ICC Ritz Carlton Hotel ...

DDS 佳得風管系統有限公司
Delta Duct Systems Ltd.
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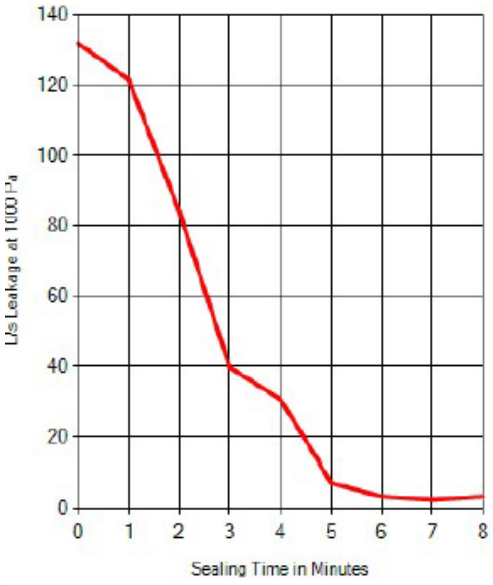
HKFSD APPROVAL

Comply with BS476 Part 6 &7

Applied into Metal Ductwork & Concrete Duct Shaft

風喉補漏 Duct Leakage Reduction -90%



When we arrived,
YOUR DUCTS HAD:
132.3 L/s of Leakage, equivalent to a
37.4 cm² Hole

After we finished,
YOUR DUCTS HAVE:
3.5 L/s of Leakage, equivalent to a
1.0 cm² Hole
This corresponds to a 97.4% Reduction in Duct Leakage.

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HVCA DW/143

SMACNA

Enquiry: Aeroseal (HK) LTD.
Tel: 852-2511 2118 Fax: 852-2507 5078
Email: ivanlee@aerosealhk.com Website: www.aeroseal.com
Address: 3/F, Unit A, Kader Building, 22 Kai Cheung Rd, Kowloon Bay, HK

ACRA Youth Committee

On behalf of the ACRA Youth Committee, it is our pleasure to have the opportunity to propose and participate in both new and typical activities for ACRA in spite of the challenging period of Covid-19 pandemic this year 2021. As well, we try our best to support the council members and stakeholders by attending meetings with various government departments and industry organizations to review current status of concerned aspects such as specifications meetings with ArchSD and BIM meetings with CIC. Other supporting areas include ACRA caring events, newsletters, etc.

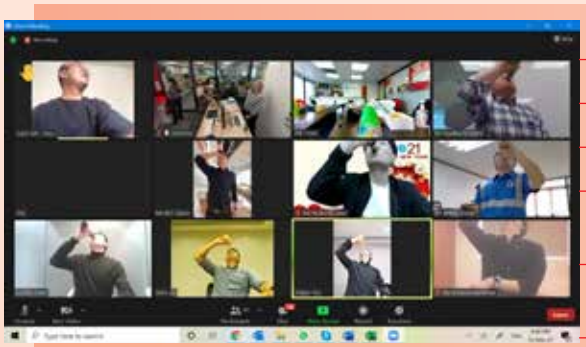
The following section will further illustrate the new virtual / related activities scheduled or hosted for this year.

Youth Committee (YC) Members
shown in photo (from left to right):
Harry Tang, Jacky Yuen, Charlton Ho, Rocky Fung, Samuel Peh, Grace Cheung, Rico Yeung, Hayley Yau (Chairlady in red), Tony Fung, Steven Chiu, Gianna Kwok, Robert Cheung, Aviva Huang, Jon Sy, Joyce Kwong
Other participated YC members not shown in photo:
Angie Chan, Theresa Chau, Alfred Heung, Sabina Chung
Photo from YC BBQ party

Spring Celebration and Beer Competition 2021 (Online)

To celebrate the Lunar Year 2021, our President Mr. Franklin Lau led the council members to send greetings wishing every member good luck and healthy through virtual meeting platform on 12 March 2021 regardless the incapability to organize the physical Spring Dinner. Subsequent to the toasting, the highly anticipated event – Online Beer Competition 2021 sponsored by BYME Engineering (HK) Ltd. was hosted which valiant ladies and gentlemen entered to compete for the champion of the strongest beer drinker.

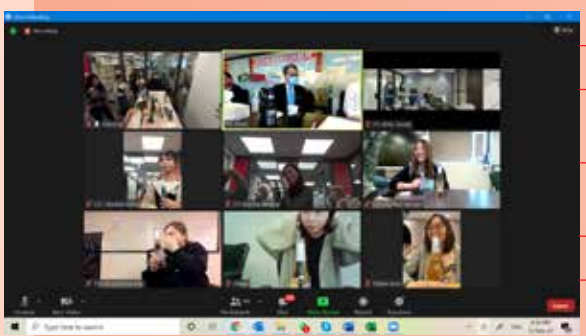
Council Members Toasting for Lunar Year 2021 Celebration led by President Mr. Franklin Lau



Beer Competition (Men)

Result of Beer Competition (Men)

Position	Participant Name	Company	Prize
King of Beer	Ben Au	Welcome Air-Tech Ltd.	HK$1,000
1st Runner Up	Anthony Ho	Southa Technical Limited	HK$500
2nd Runner Up	Dylan Lai	The Jardine Engineering Corporation, Limited	HK$300
3rd Runner Up	Kendrew Ng	Alliance Contracting Co., Ltd.	HK$200



Beer Competition (Women)

Result of Beer Competition (Women)

Position	Participant Name	Company	Prize
Queen of Beer	Hannah Ho	Alliance Contracting Co., Ltd.	HK$500
1st Runner Up	Pun Yan Yan	Alliance Contracting Co., Ltd.	HK$200
2nd Runner Up	Bettina Lai	Southa Technical Limited	HK$100

Photo Contest 2021 ‘清風留影’

The first Photo Contest of ACRA sponsored by Daikin Airconditioning (Hong Kong) Limited was held from 20 March 2021 to 31 May 2021. Numerous photos have been received for this contest featuring the depiction of air conditioning industry. Winners of the contest are to be announced.

Upcoming Events

On top of the Photo Contest, there will also be a **Video Contest 2021** scheduled in the 3rd Quarter of this year. What's more electrifying? ACRA will be bringing you to its foremost **AR Visit to Manufacturers** in the second half of 2021 despite the cross-border restrictions caused by the coronavirus pandemic. We look forward to your responsive participation for advocating our innovative events.

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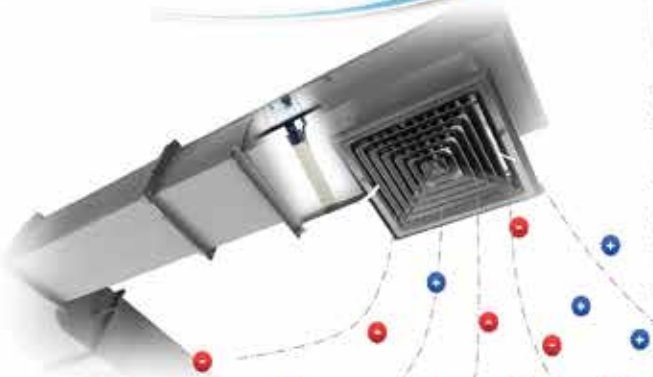
AtmosAir generates oxygen ions that are carried to your workspace by ventilating air flow.

Bacteria / virus are **deactivated** by these ions **RIGHT AT YOUR BREATHING ZONE**, not somewhere near your traditional air purification devices nor at filter inside your air duct.

This **ACTIVE APPROACH** of purification can also **deactivate bacteria / virus rest on touch surfaces** like table tops, doorknobs, counter-tops..., areas traditional air purification technologies cannot treat.



Prevent mold

Reduce VOC

Reduce 99.92% Human Coronavirus(1)

Ozone safe UL2998 compliant

Reduce PM

(1) Results published by Microchem Laboratory in Texas USA

See a short video about AtmosAir SOLUTIONS

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香港九龍官塘開源道50號利寶時中心16樓01室
Room 1601, 16/F., Lemmi Centre, 50 Hoi Yuen Road,
Kwun Tong, Kowloon, Hong Kong

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www.sanyikgroup.com

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New Members

From Nov 20 to Apr 21

1	Associate Member	Lee Yip Metal Products Company Limited	Nov-20
2	Associate Member	The Hong Kong & China Gas Company Limited	Nov-20
3	Associate Member	Sun Chun (E & M) Engineering Limited	Dec-20
4	Associate Member	Greentech Engineering Limited	Feb-21
5	Associate Member	Lap Kei Engineering Company Limited	Apr-21

Next Generation Refrigerant Development Course (Webinar)

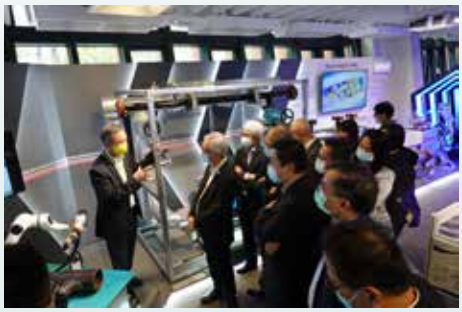
The 8th class of the Next Generation Refrigerants Development hosted by ACRA, EMSD and VTC was held through Webinar on 19 March 2021. Details on the next generation refrigerants with less impact on our planet's ozone layer and climate according to the enforcement of the latest global regulations to reduce the hydrofluorocarbons was reviewed to encourage the industry to widely apply these new and more eco-friendly refrigerants in all HVAC projects in Hong Kong.

Practical Training Course on Household Air-Conditioners using Mildly Flammable Refrigerant

From March to May 2021, ACRA, EMSD and Pro-Act by VTC have co-organized the Practical Training Course on Household Air-Conditioners using Mildly Flammable Refrigerant at VTC Pokfulam Training Centre Complex. This course not only identifies the characteristics of various refrigerants but also diagnoses the features, relevant OSH legislations, safe handling and technical requirements of mildly flammable refrigerant. Most importantly, practical training on how to execute appropriate installation, testing and report of R32 refrigerant was also provided for the industry practitioners.

Visit to DfMA MiMEP Tradeshow 2021

The trend of applying DfMA and MiMEP to E&M projects has become a hot topic in the industry. Consequently, ACRA has conducted a visit to the significant DfMA MiMEP Tradeshow 2021 organized by Construction Industry Council (CIC) and HKFEMC at the CIC Zero Carbon Park on 11 March 2021. Our President, Mr. Franklin Lau, together with the council members and subcommittee members were impressed by examining showcases from various contractors regarding the industry's capability in DfMA and the multi-trade integrated approach for MEP works.



Caring Campaign to Fight Against Novel Coronavirus

ACRA fully supports the ease for any of our workers in the E&M or construction industry suffering difficulties due to stop work from quarantine or illness caused by the Covid-19 pandemic. Appreciation to our generous members, considerable donation has been generated from our 3 rounds of fundraising activities which will be submitted to CIC's funding provision for the Caring Campaign to Fight Against Novel Coronavirus.

Caring Event – Happy Bags' Delivery to Elderly
關懷社區行動 2020 — 開心福袋贈長者

Our caring events never ceased although the whole world is plagued with Covid-19 pandemic. On 6 February 2021, the utmost caring event – Happy Bags' Delivery to Elderly which ACRA jointly organized with HKFEMC and Open Door Ministries has distributed happy bags to 100 low-income elderly households at Lam Tin. This mission was brilliantly accomplished with the leadership and support of our Caring Committee Chairman, Mr. Raymond Synn together with HKFEMC's President, Mr. Rocky Poon, ACRA's President Mr. Franklin Lau and Council Members as well as Youth Committee Members, member sponsors and participated volunteers.

Special thanks to the following kindheartedness company sponsors:

ATAL Building Services Engineering Limited	Alliance Contracting Company Limited
Bun Kee (International) Limited	CDBM Engineering Consultant Company Limited
C.J. Wishing International Limited	Eaxon International Company Limited
Fook Loong (HK) Ltd.	GELEC (HK) Limited
Galaxy Engineering Holding Co., Ltd.	Golden Leaf International (Hong Kong) Limited
Hilti (HK) Limited	IES Engineering (Hong Kong) Limited
Krueger Engineering (Asia) Limited	Lee Yip Metal Products Company Limited
Luen Ming E&M Engineering Ltd.	McQuay Air-Conditioning Limited
Mesan Fiberglass Engineering (International) Limited	Netsphere Solution Ltd.
REC Engineering Company Limited	Ritech Engineering & Supply Co., Ltd.
Ryowo (Holding) Limited	Southa Technical Limited
The Jardine Engineering Corporation Limited	Token Engineering Ltd.
Welcome Air-Tech Ltd.	White Hippo Limited
Wo Lee Steel Co., Ltd	Zenith International Enterprise Ltd.

Web Revision Course on Handling HFC & Blended Type Refrigerants for ArchSD Contracts

In April 2021, an e-tutorial for the semi-annual Revision Course on Handling HFC & Blended Type Refrigerants for ArchSD Contracts hosted by ACRA has attracted over 45 workers from the industry who had previously completed the training course to participate again for reviewing the key updates on the refrigerants in consideration with safety and environmental factors for the opportunity of work enhancement.

MEMBER LIST

	Company Name		Contact Number	Website / Email	Trade			
					Contracting	Manufacturing	Servicing	Supplier
ACRA Fellow Members	ATAL Engineering Limited	安樂工程有限公司	2561 8278	www.atal.com	●		●	●
	Carrier Hong Kong Limited	開利 (香港) 有限公司	2694 5375	www.carrier.com.hk	●	●	●	●
	Krueger Engineering (Asia) Limited	高雅機電工程有限公司	2860 7333	www.krueger.com.hk	●			
	Newland Engineering Limited	新陸工程有限公司	2967 8620	moshiu@newland.com.hk	●			
	REC Engineering Company Limited	盈電工程有限公司	2619 8888	www.rec-eng.com	●		●	
	Shinryo (Hong Kong) Limited	新菱工程香港有限公司	2237 8624	www.shinryo.com	●			
	Shun Hing Engineering Contracting Company Limited	信興機電工程有限公司	2419 8282	www.shecon.com	●			
	The Jardine Engineering Corporation Limited	怡和機器有限公司	2807 4511	www.jec.com	●		●	●
	Trane Hong Kong	特靈香港	3128 4756	www.tranehk.com		●	●	●
	Winston Air Conditioning & Engineering (Hong Kong) Company Limited	永通冷氣工程 (香港) 有限公司	2764 1200	www.winston-hk.com	●		●	
	York International (Northern Asia) Limited	約克國際 (北亞) 有限公司	2590 0012	www.johnsoncontrols.com	●	●	●	●
	Young's Engineering Company Limited	景福工程有限公司	2235 0900	www.youngs.com.hk	●		●	
ACRA Ordinary Members	Alliance Contracting Company Limited	聯和承造有限公司	2891 9083	www.alcc.com.hk	●			
	Analogue Technical Agencies Limited	安樂科技有限公司	2561 8278	www.atal.com				●
	ATAL Building Services Engineering Limited	安樂機電設備工程有限公司	2561 8278	www.atal.com	●		●	●
	Bun Kee (International) Limited	彬記 (國際) 有限公司	2748 9319	www.bunkee.com				●
	BYME Engineering (Hong Kong) Limited	嘉福機電工程有限公司	2881 6690	www.bymehk.com	●		●	
	Carewin Engineering Limited	嘉榮行工程有限公司	2898 2183	admin@carewinhk.com	●		●	
	Chevalier (E & M Contracting) Limited	其士 (機電工程) 有限公司	2111 4811	www.chevalier.com	●			
	China State Mechanical & Electrical Engineering Limited	中國建築機電工程有限公司	2823 7888	www.cohl.com	●			
	Chun Wo E & M Engineering Limited	俊和機電工程有限公司	3758 8007	www.chunwo.com	●			
	Daikin Airconditioning (Hong Kong) Limited	大金冷氣 (香港) 有限公司	3966 9528	www.daikin.com.hk				●
	Efatar Environmental Protection Equipment Limited	怡輝環保器材有限公司	2606 6922	www.cold-magic.com		●	●	●
	Fook Loong (HK) Limited	福隆 (香港) 有限公司	2393 7773	www.flhk.com.hk				●
	Gammon E&M Limited	金門機電工程有限公司	2516 8823	www.gammonconstruction.com	●			
	Gate Way Valve & Fitting Limited	基法水管配件有限公司	2688 2666	www.gatewayv.com.hk				●
	Honeywell Limited	霍尼韋爾 (香港) 有限公司	2331 9133	www.honeywell.com			●	●
	Hsin Chong Aster Building Services Limited	新昌亞仕達屋宇設備有限公司	2675 3300	https://aster.hk.com	●			
	Johnson Controls Hong Kong Limited	江森自控香港有限公司	2590 0012	www.johnsoncontrols.com	●	●	●	●
	K-Thorn Engineering Company Limited	旗鋒工程有限公司	2481 2918	main@k-thorn.com.hk	●			
	Lik Kai Engineering Company Limited	力佳工程有限公司	2611 4501	ericyung@likkai.com.hk	●			
	Lucky Engineering Company Limited	運通冷氣電業有限公司	2780 5285	general@luckyeng.com.hk	●			
	McQuay Air-Conditioning Limited	麥克維爾空調有限公司	2893 6261	www.mcquay.com.hk	●	●	●	●
	MECO Engineering Limited	德寶工程有限公司	2774 8200	meco-engltd@yahoo.com.hk	●			
	Midea Electric (Hong Kong) Limited	美的電器(香港)有限公司	3669 4888	www.mideahk.com	●	●		●
	Quad-Tech Engineering (Hong Kong) Company Limited	高得工程有限公司	2573 1832	qt@quadtech.com.hk	●			
	Raising Engineering Limited	威信工程有限公司	2395 6081	simonsiu@raising.com.hk	●			
	Ryowo (Holding) Limited	菱和 (集團) 有限公司	2391 8381	www.ryowo.com		●		
	Siemens Limited	西門子有限公司	2107 6506	andy.wong@siemens.com				●
	Skyforce Engineering Limited	天科工程有限公司	2885 1620	info@skyforce.com.hk	●			
	Southa Technical Limited	南龍機電工程有限公司	2963 7175	www.southa.com				●
	Standard Refrigeration & Engineering Company Limited	立德工程有限公司	2781 0871	SRE@hklpg.com.hk	●		●	●
	Takasago Thermal Engineering (Hong Kong) Co., Ltd.	高砂熱學工業 (香港) 有限公司	2520 2403	sales@takasago.com.hk	●		●	
	Technicon Engineering Limited	得力確工程有限公司	3193 1300	technic@technicon.com.hk	●			
	Welcome Air-Tech Limited	偉基空調有限公司	2806 8316	www.saiver-welaire.com.hk		●	●	●
	Westco Air Conditioning Limited	威高冷氣工程有限公司	2426 3123	mandylo@scee.com.hk	●			

ACRA Associate Members

Company Name		Contact Number	Website / Email	Trade
ABB (Hong Kong) Limited		2929 3800	www.abb.com.cn	Supplier
A-Gas Environmental Services HongKong Limited		3188 5078	www.agas.com	Servicing
A & R Engineering Company Limited	奇樂工程有限公司	2408 2960	general@arengco.com.hk	Contracting
Aires Engineering Company Limited	毅力機電工程有限公司	2658 8856	adrianwong@aires.com.hk	Contracting
Alpha Appliances Limited	第一電業有限公司	2529 7555	www.alpha-general.com	Supplier
Anway Engineering Company Limited	正隹工程有限公司	2598 4228	www.anway.com.hk	Supplier
Armacell Asia Limited	阿樂斯亞洲有限公司	2574 8376	www.armacell.com	Manufacturing
Arnhold & Co., Ltd.	安利有限公司	2807 9400	patricklai@arnhold.com.hk	Supplier
A Shing Engineering Company Limited	亞成冷氣工程有限公司	2537 1818	wilkiengan@ashing.com.hk	Contracting, Manufacturing, Servicing, Supplier
Auto Integrated Limited	奧力科技有限公司	2612 0758	rickie@autoinhk.com	Manufacturing, Supplier
BELIMO Actuators Limited	搏力謀執行器有限公司	2687 1716	www.belimo.com	Manufacturing
Bollfilter Hong Kong Ltd.	波勒過濾系統(香港)有限公司	2715 5000	www.bollfilterchina.com	Manufacturing, Servicing, Supplier
Biocline Healthcare Services Limited	新康醫療器材工程有限公司	2672 1111	bio@biocline.com	Contracting, Supplier
Bitzer Refrigeration Asia Limited	比澤爾制冷亞洲區有限公司	2868 0206	www.bitzer.de	Supplier
Brisky Limited	穿梭科技有限公司	2511 3161	tkwan@briskyltd.com	Contracting, Servicing, Supplier
Castco Testing Centre Limited	佳力高試驗中心有限公司	2597 8333	www.castco.com.hk	Laboratory Testing
Centalink International Limited	信嘉國際有限公司	2626 1897	andy@centalink.com.hk	Manufacturing, Supplier
CDBM Engineering Consultant Company Limited	新雄力工程顧問有限公司	2598 1088	mail@cdbm.asia	Contracting
Cheung Kee Metal Company Limited	祥記五金有限公司	2393 1448	www.ckmetal.com	Supplier
Chi Yip Engineering Company	志業工程公司	3078 9984	canny@acmv-cy.com	Contracting, Supplier
Chin Tat Trading Company	展達貿易公司	3521 1589	www.chintat.com.hk	Supplier
Chit Tat Electrical Engineering Limited	捷達機電工程有限公司	2529 8888	chittat@yahoo.com.hk	Contracting, Manufacturing, Servicing
Chong Kin Air-Condition Trading Engineering Co., Ltd.	創建冷氣貿易工程有限公司	2307 5159	www.chongkinaircon.biz.com.hk	Contracting, Supplier
C.J. Wishing International Limited	惠生電業有限公司	2799 9797	cjwish@cjwish.com.hk	Supplier
CLP Power Hong Kong Limited	中華電力有限公司	2678 7350	www.clpgroup.com	Contracting, Manufacturing, Servicing, Supplier, Electricity Supply
Clydeman Engineering Limited	佳電工程有限公司	2332 3591	daniel@clydeman.com	Contracting, Servicing, Supplier
CMA Testing & Certification Laboratories Limited	廠商會檢定中心	2698 8198	www.cmatesting.org	Laboratory Testing
Crowntin Limited	冠殿有限公司	8202 0830	clchoy@crowntingrp.com.hk	Contracting, Supplier
Delta Pyramax Company Limited	佳澤科技有限公司	2511 2118	www.deltapyramax.hk	Supplier
Dictson Engineering Ltd.	迪迅工程有限公司	2891 8070	lui@dictson.com.hk	Contracting, Servicing
Dynalink International Technology Limited	匯能國際科技有限公司	3955 0203	www.di-technology.com	Contracting, Servicing, Supplier
Eaxon International Company Limited	恩索有限公司	3590 4656	gamescheung@eaxon.hk	Manufacturing, Servicing, Supplier
ebm-papst Hong Kong Limited	依必安派特香港有限公司	2145 8678	info@hk.ebmpapst.com	Manufacturing, Supplier
Electrodrive Engineering Limited	高宜工程設備有限公司	2573 7211	info@electrodrive-eng.com	Supplier
Enviro-Tech Engineering Company Limited	鷹達工程有限公司	2827 0688	steveli@envirotech.com.hk	Supplier
Ever Cool Refrigerating & Air-Conditioning Co., Ltd.	嘉毅冷凍空調設備有限公司	2356 8598	info@evercoolhk.com	Manufacturing, Supplier
Evergreen Environmental Technology Company Limited	冬青環保科技有限公司	2562 3331	www.evergreen-environmental.com	Supplier
Extensive Trading Company Limited	精基貿易有限公司	2889 1681	www.extensive.com.hk	Supplier
Far East tEngineering Services Limited	遠東工程服務有限公司	2898 7331	www.fareast.com.hk	Contracting, Servicing
Fortune Links Hong Kong Limited	鑫力香港有限公司	2562 9399	info@fortunelinks.com.hk	Manufacturing, Servicing, Supplier
GTECH Services (Hong Kong) Limited	英國通用工程 (香港) 有限公司	2123 0888	www.gtechservices.com.hk	Contracting
GELEC (HK) Limited	香港通用電器有限公司	2919 8383	hq@gelec.com.hk	Supplier
Gether-Force Air-Conditioning Engineering Co., Ltd.	群力冷氣工程有限公司	2890 2622	geforce@hknet.com	Contracting
Getwick Engineers Limited	佳域工程有限公司	2893 3600	getwick@getwick.com	Contracting
Glory Air-Conditioning Limited	天恩空調有限公司	3487 9092	wallace@gloryacltd.com	Contracting, Servicing, Supplier
Golden Leaf International (Hong Kong) Limited	金葉國際(香港)有限公司	2648 1000	info@glint.com.hk	Contracting, Servicing
Goodway Electrical Engineering Limited	佳濤電業有限公司	2405 0888	www.goodwaygrille.com	Manufacturing, Supplier
Gotop Engineering (HK) Limited	高陞工程 (香港) 有限公司	2459 3038	gotopco@yahoo.com.hk	Contracting
Great Top Engineering Limited	宏鋒工程有限公司	2345 2219	general@greattop.com.hk	Contracting
Greentech Engineering Limited	堅迪工程有限公司	2776 3128	www.hk-greentech.com	Contracting

MEMBER LIST

ACRA Associate Members

Company Name		Contact Number	Website / Email	Trade
GRUNDFOS Pumps (Hong Kong) Ltd.	高福水泵(香港)有限公司	3540 0300	www.grundfos.com	Manufacturing
Hang Ji Industries International Co., Ltd.	恒基工貿國際有限公司	2721 6129	www.hangji.com	Manufacturing
Hensen System Engineering Limited	豪信系統工程有限公司	2884 9001	cecil@hensen.com.hk	Supplier
Hilti (HK) Limited	喜利得 (香港) 有限公司	2773 4705	www.hilti.com.hk	Manufacturing
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
Hofmann Construction Material Ltd.	香港好夫曼建材有限公司	3157 1841	www.hofmannhq.com	Supplier
Honest Air Conditioning Limited	明發冷氣有限公司	2396 8108	www.achonest.com	Contracting, Supplier
H.W. International Air-Conditioning Limited	豪華國際空調有限公司	2796 8888	info@hooair.com	Manufacturing
IES Engineering (Hong Kong) Limited	恒豐工程 (香港) 有限公司	2992 0830	www.ieshk.com.hk	Servicing, Supplier
InnoTec Engineering Ltd.	科技工程有限公司	3706 6333	info@innoteceng.com	Contracting
Intelligent Technologies Limited	毅智科技發展有限公司	2301 4868	info@intelligent-net.com	Supplier
Jade Star Engineering Limited	捷陞工程有限公司	3998 3256	jadestarhk@yahoo.com.hk	Contracting, Servicing
JC (HK) Engineering Limited	悅峰工程有限公司	2898 9885	jc.hk.eng@gmail.com	Contracting, Manufacturing, Servicing, Supplier
J & J Network Engineering Company Limited	信卓網絡工程有限公司	3579 5263	www.jjnetwork.com.hk	Supplier
Johnson Controls-Hitachi Air Conditioning Trading (Hong Kong) Limited	江森自控日立空調貿易 (香港) 有限公司	2590 0012	www.jci-hitachi.com	Manufacturing, Supplier
Joneson Environmental Technologies Limited	忠誠環保科技有限公司	2889 8220	jet@fsenv.com.hk	Contracting, Manufacturing, Servicing, Supplier
Join Rich Engineering Limited	億聯工程有限公司	3153 2048	www.joinrich.com.hk	Contracting
Jinchat Engineering (HK) Company Limited	正卓工程 (香港) 有限公司	2687 1755	jyin@jinchat.com	Manufacturing, Servicing, Supplier
Jun Feng Company Limited	駿峯有限公司	2707 3088	www.junfeng.com.hk	Servicing, Supplier
Kamui Cold Chain Engineering & Service Limited	淦鎧冷鏈工程服務有限公司	2688 7778	compassengltd@yahoo.com.hk	Contracting, Servicing
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
Kingsfield Engineering Ltd.	堅輝工程有限公司	2815 9560	www.kelhk.com	Servicing
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
K-Flex (Hong Kong) Insulation Company Limited	凱門 (香港) 保溫材料有限公司	2668 5202	www.k-flex.com	Manufacturing
KSB Limited	凱士比有限公司	2147 1226	philip.chow@ksb.com.hk	Manufacturing
K.Y.H. Steel Company Limited	金源行鐵倉有限公司	3473 2332	www.kyh.com.hk	Supplier
Laser Resources (Asia) Company Limited	全美 (亞洲) 有限公司	2516 7500	laasiahh@netvigator.com	Manufacturing, Supplier
Lap Kei Engineering Company Limited	立基冷氣工程有限公司	2798 8210	www.lapkeieng.com	Contracting, Servicing
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
Lee Yip Metal Products Compnay Limited	利業金屬有限公司	3651 2698	www.leekeegroup.com	Supplier
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	Manufacturing, Supplier
Luen Fat Air Condition (Holding) Trading & Engineering Co., Ltd.	聯發冷氣(集團)貿易工程有限公司	2345 0280	www.luenfat.com	Supplier
Luen Ming E & M Engineering Ltd.	聯明機電工程有限公司	3619 9186	info@luenmingem.hk	Contracting
Luen Ming Pengshan Air Conditioning Factory Ltd.	聯明坪山冷氣製品廠有限公司	2797 2168	www.luenming.com	Supplier
Man Tung Air-Conditioning E & M Ltd.	萬通冷氣機電有限公司	3165 8698	www.manshungroup.com.hk	Contracting
Mason Industries (HK) Limited	梅森實業有限公司	2967 9639	www.mason-hk.com	Supplier
Maxwell Electrical Asia Ltd.	美基電器亞洲有限公司	3583 5088	www.maxwell-asia.com	Manufacturing, Servicing
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
Mitsubishi Electric (Hong Kong) Limited	三菱電機 (香港) 有限公司	2887 4575	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
O-Link Limited	奧聯(國際)有限公司	2619 8888	www.o-link.com.hk	Manufacturing
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	3749 5272	www.pacificsense.com.hk	Contracting, Supplier
Paul Y. (E&M) Contractors Limited	保華機電工程有限公司	2831 8338	www.pyengineering.com	Contracting
PowerTech IPC Company Limited	科力發展有限公司	3105 3928	www.powertechipc.com	Servicing, Supplier
Powers Technical Services Limited	寶華技術服務有限公司	2770 2110	powers.pts@gmail.com	Contracting

ACRA Associate Members

Company Name		Contact Number	Website / Email	Trade			
				Contracting	Manufacturing	Servicing	Supplier
Practical Engineering (Hong Kong) Company Limited	百利高工程 (香港) 有限公司	2402 2772	practical@practical.hk	●			●
Pyrofoe Engineers Limited	衛安工程有限公司	2388 8038	www.pyrofoe.com.hk	●			
Ready Electrical Metal Work Limited	全達電器金屬製品有限公司	2898 8623	kw_leung@ready-group.com	●	●		
REC Green Technologies Company Limited	盈電環保科技有限公司	2619 8817	www.yaulee.com			●	●
Regin Controls Hong Kong Limited	瑞晶溫控香港有限公司	2407 0281	saleshk@regin.se		●		●
Ritech Engineering & Supply Company Limited	偉達工程材料有限公司	2410 1819	www.ritech-hk.com				●
San Yik Air Conditioning Engineering Company Limited	新益冷氣工程有限公司	3565 5812	www.sanyikgroup.com	●		●	●
Sanby Trading Company Limited	聖備貿易有限公司	2573 4219	www.sanby.com				●
Samsung Electronics H.K. Company Limited	三星電子香港有限公司	2862 6300	www.samsung.com.hk		●		
Savills Engineering Limited	第一太平戴維斯設備工程有限公司	3622 3309	chytsang@savills.com.hk	●		●	
Shenling Environmental Systems (Hong Kong) Ltd.	申菱環境系統 (香港) 有限公司	2603 0002	www.shenling.com				●
Shun Hing E & M Engineering Limited	順興機電工程有限公司	2387 2882	project@shunhingeng.com	●			●
Shun Hing Electric Service Centre Limited	信興電器服務中心有限公司	2406 5333	www.shunhing-service.com			●	
Shun Hing Electronic Trading Co. Ltd.	信興電器貿易有限公司	2733 3888	www.shunhinggroup.com	●			●
Shun Tung Engineering Company Limited	順通冷氣電機工程有限公司	2633 6866	gabriel@shun-tung.com	●			
Sing Kin Limited	陞建有限公司	2333 1518	singkin@gmail.com	●			
Smartech HVAC & Engineering Limited	智能空調工程有限公司	2521 9768	info@smartech-hvac.com.hk				●
Southa Engineering Limited	南龍工程有限公司	2963 7241	www.southa.com	●			
Stars (Hong Kong) A/C & R Company Limited	恆星 (香港) 冷熱設備有限公司	6116 7832	stanley_yuen@hstars.com.cn		●		
Sun Chun (E & M) Engineering Limited	新駿 (機電) 工程有限公司	3613 0755	info@sunchuneng.com	●			
Sun First International Limited	昇福國際有限公司	2807 7888	www.sunfirst.com.hk				●
Sun Yu Chau Engineering Company Limited	新宇宙工程有限公司	2345 9355	www.sycengg.com.hk	●			
Sunny Fire Engineering Ltd.	華輝建材有限公司	2395 6766	sunnyfireengltd@gmail.com	●			
Superpower Pumping Engineering Company Limited	力霸水泵機械工程有限公司	2745 3562	www.sppump.com				●
Sustainable Energy Limited	恆澤節能有限公司	2332 3077	www.sustaine.com.hk		●	●	
Target Energy Solutions Limited	達標能源管理有限公司	2345 0298	www.targetensol.com			●	
Teembase Development Limited	天基發展有限公司	2554 6263	www.teembase.com				●
The Hong Kong & China Gas Company Limited	香港中華煤氣有限公司	2963 3368	www.towngas.com				●
Tinwood Pacific Limited	天匯太平洋有限公司	3956 9751	www.sinro.com		●		
Tomi Fuji EMC Limited	富滕能源管理有限公司	2432 0170	www.tomifuji.com.hk			●	
Tom's Equipment Company Limited	義隆設備有限公司	2757 5539	tom@toms-equipment.com				●
TICA-SMARDT Hong Kong Limited	天加思茂特香港有限公司	2772 8448	hk.info@smardt.com				
Tin Sing Chemical Engineers Ltd.	天成化工有限公司	2619 8858	www.rec-tsc.com			●	●
Trisun Air Conditioning System Limited	三陽系統有限公司	2377 1618	enquiry@trisun.com.hk	●		●	●
TROX Hong Kong Limited	妥思香港有限公司	2861 2261	www.troxapo.com				●
Tung Shing Hardware Co., Ltd.	東成五金有限公司	2626 9983	www.tungshinghardware.com.hk				●
Union (Luen Hop) Refrigeration Co., Ltd.	聯合冷氣工程有限公司	2627 4600	unionlh@bizentvigator.com	●			
United Controls (Hong Kong) Limited	統一儀器 (香港) 有限公司	2556 1001	www.ucl668.com			●	●
Victaulic Hong Kong Ltd.		6898 6823	www.victaulic.com		●	●	●
Victory Engineering Service Company Limited	維陞工程有限公司	2979 4068	pamela@ves.hk				●
Viewco Building Services & Engineering Co., Ltd.	偉保工程有限公司	2543 0610	engineering@viewco.com.hk	●			
Vircon Limited	雲建有限公司	2617 2770	www.vircon.com.hk	●		●	●
Wai Luen Air Conditioning Limited	偉聯空調設備有限公司	2890 9321	garychan@wailuenhk.com	●			
Wai Tat E & M Engineering Company Limited	偉達機電工程有限公司	2682 7200	fungscww@netvigator.com	●			
Wardson Engineering Limited	華順工程有限公司	2329 8268	wsengltd@yahoo.com.hk	●			
White Hippo Limited	白河馬企業有限公司	2303 1318	www.kshop310.hk				●
Wilco Engineering Limited	駿陶工程有限公司	2344 7725	info@wilcoenghk.com	●			
Wing Shing Air-Flow Company Limited	永盛風咀製品廠有限公司	2792 6331	accounting@wingshing-hvac.com		●		●
Wo Lee Steel Company	和利鋼鐵有限公司	2393 0131	www.wolee.com				●
Wolter Asia Limited	華德亞洲有限公司	2456 0198	info@wolter.com.hk		●		●
Wysermann Company Limited	威士文有限公司	2614 2213	wysermann@wysermann.com.hk		●		●
Yin On Trading Limited	賢安建材貿易有限公司	2572 7110	office@yinon.com.hk				●
Yordland Engineering Limited	日島工程有限公司	2362 2186	www.yordland.com	●		●	●
York Choi Industrial Limited	旭彩實業有限公司	2795 8286	www.yorkchoi.com		●		
Yuen Fong Air-Condition Products (HK) Limited	圓方空調設備製品(香港)有限公司	2880 5880	yuenfongaircondition@hotmail.com				●
Zenith International Enterprise Ltd.	盛豐國際企業有限公司	2815 5852	www.ebara.com.hk				●

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M+ Museum, The West Kowloon Cultural District, Tsim Sha Tsui
Year of Completion : 2020

Liantang / Heung Yuen Wai Boundary Control Point
Year of Completion : 2019

Victoria Dockside, Tsim Sha Tsui
Year of Completion : 2019

Passenger Clearance Building, Hong Kong Boundary Crossing Facilities, Hong Kong - Zhuhai - Macao Bridge.
Year of Completion : 2017

Fire and Ambulance Services Academy, Tseung Kwan O
Year of Completion : 2015

T-Park, Tuen Mun
Year of Completion : 2014

Central Mail Centre, Kowloon Bay
Year of Completion : 2013

CIC-Zero Carbon Park, Kowloon Bay
Year of Completion : 2012

Civil Aviation Department, Lantau Island
Year of Completion : 2011

Grand Lisboa Hotel, MACAU
Year of Completion : 2008

Nina Tower, Tsuen Wan
Year of Completion : 2007

Wynn Resorts Phase I and II, MACAU
Year of Completion : 2006

Airport Railway-Hong Kong Station Four Seasons Hotel
Year of Completion : 2005

The University of Hong Kong-The New Medical Complex
Year of Completion : 2002

International Financial Centre Phase I (IFC-I) South West Tower at Hong Kong Station
Year of Completion : 1998

Court of Final Appeal, Central
Year of Completion : 1996

Prince of Wales Hospital General Cancer Centre, Shatin
Year of Completion : 1994

Queen Mary Hospital Extension-Block B
Year of Completion : 1992