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## Message from the President

ACRA faced numerous challenges during the last three years due to the risk of pandemic and the uncertainty of global business environment. Despite these hurdles, I am pleased with the support from our council members and market stakeholders, showcases our unwavering determination to return to normalcy and lead the Association to meet industry expectations with regard to the adoption and improvement of quality, productivity and environmental protection.



**Ir M.T. LAW**  
President

ACRA continuously made valuable contributions to the industry and actively participated in different liaison task forces, giving technical advice on statutory and regulatory requirements to safeguard against market changes.

Some salient events during this period are highlighted as follows:

Firstly, we reviewed and gave our recommendations on the Government General Specification 2022 edition in September of 2022 and Part XI of FSD Circular Letter No. 4/1966 issued in September 2023. Our proposed initiatives effectively addressed technical issues, trade practices and market conditions, and many of them were considered and included in the publications.

During the past year, we were involved in the Working Group for the revision of the Standard Method of Measurement (SMM) in the Building Services Sections, in particular, the electrical and mechanical systems and the construction of MiMEP, to be published by the Hong Kong Institute of Surveyors. We raised comments regarding the measurement method for elements of modules in MiMEP. We suggested that the items related to the preparation of design proposals, BIM models, method statements, and fabrication drawings of MiMEP prefabrication units should be added separately and priced independently from the construction cost of modules. This will enable interim payment certification during the MiMEP preparation stages, helping to alleviate the financial burden on the contractors.

In addition, we actively participate in the work groups from EMSD and HKGBC to provide updates on guidelines for retro-fit commissioning to promote the best practice operation, retro-fit commissioning and digital twin technologies to enhance equipment and plant energy efficiency.

Moreover, we are glad to have obtained FSD's relaxation of the calibration period for testing instruments used in the staircase pressurization and smoke extraction

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





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..... From cover page

system from 3 months to 12 months. It can eliminate the risk of contractors facing instrument expiry, which could hinder work progress.

Recognizing the future mainstream use of ultra-low global warming potential (GWP) refrigerants in water-cooled chillers, ACRA has organized a task force to collaborate closely with relevant authorities on their development. Regarding the EPD's recent consultation paper proposing a GWP 150 for water-cooled chillers, we have suggested revising this to a GWP of 750 to better align with market expectations and encourage more participants to join this business transformation. We believe our suggestion has been well-received by the EPD, and we anticipate an update soon. We will continue monitoring the status, analyzing market trends, and providing our perspective to the authorities for their consideration.

We acknowledge that quality is a key for the success of our business operations. Consequently, we actively emphasize integrity and quality control in the procedures. Recently, we have just completed a review of the quality control measures for ductwork fabrication used in government's projects. We collaborated with all relevant parties and provided advice on procedures to do the quality check in a practical way.

Same as quality, we encourage our members to prioritize safety standards in their business activities and consider safety promotion as our mission. In 2023, we actively assisted our members and their staff in participating in the Voluntary Registration Scheme for Technicians Handling Mildly Flammable Refrigerant of Household Air-conditioners launched by EMSD. We appreciate this Scheme for implementing systematic control in advance which can effectively raise awareness of safe working practices when handling flammable refrigerants. We eagerly anticipate the legislative process for mandatory registration and will contribute our professional knowledge to advance the scheme and assist our members in coping with this statutory control.

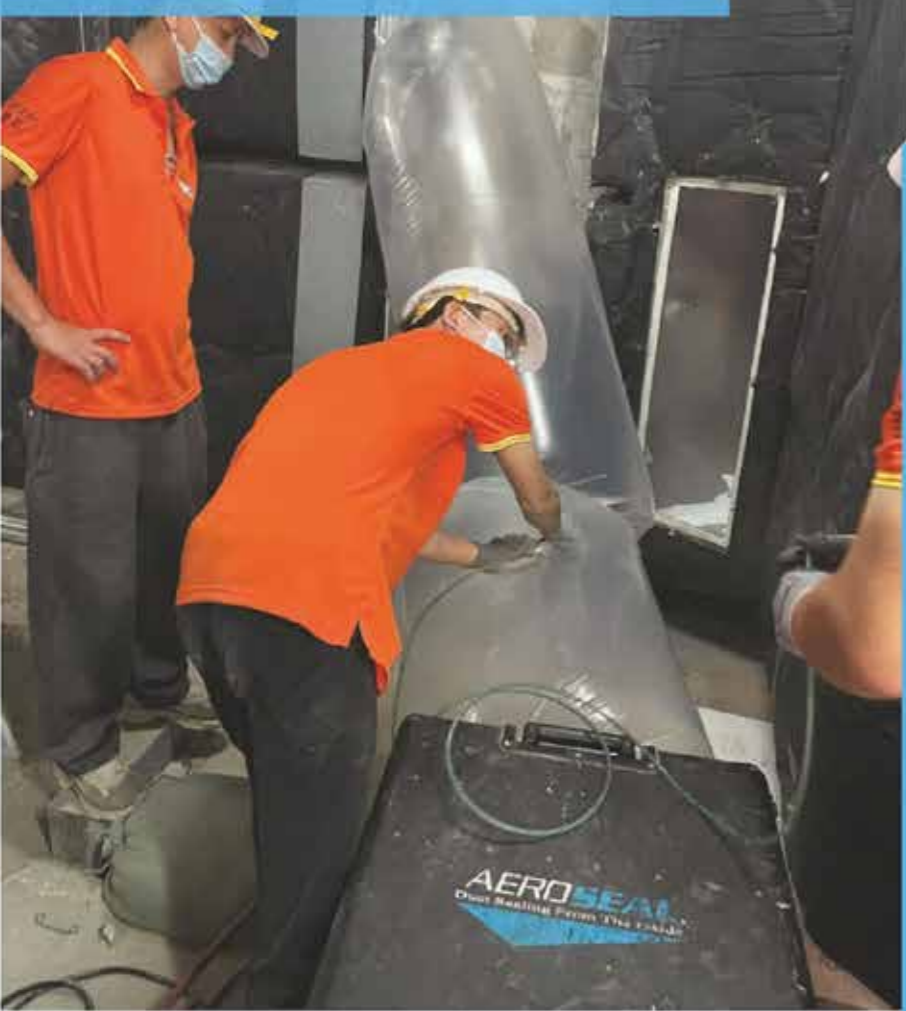
Besides the Registration Scheme, we are working with EMSD on the technical review of the BEC 2021 for 2024 edition. One of the key elements currently under review is the thickness of thermal insulation for the chilled water pipework, suction refrigerant pipes and ductwork inside false ceilings. Based on our findings from actual measurements results, we have provided technical suggestions to EMSD, proposing a reduction in the minimum insulation thickness.

ACRA remains committed to strengthening our engagement and promoting professionalism in the industry. We will continue to adopt a forward-looking approach to promote the application of innovative solutions and digitalization throughout the design, manufacturing, installation, commissioning and maintenance process.

As an ACRA council member since 2010 and President for the past two years, I have had the privilege of witnessing many delightful and memorable moments within ACRA. I look forward to experiencing many more in the future. I would also like to extend my thanks to the council members, sub-committee members, and administration officer of ACRA for their dedication in helping the Association achieve remarkable heights.

Finally, it gives me great pleasure to address all our members, without whom all the achievements we made before would not have been possible. As I stand here today, I am happy to see that our spirit of selfless service to the industry will be carried on by our successor. Under the leadership of the new President and the Board, I am confident that our Association will continue to thrive and fulfill our mission of serving and building a better future for Hong Kong.

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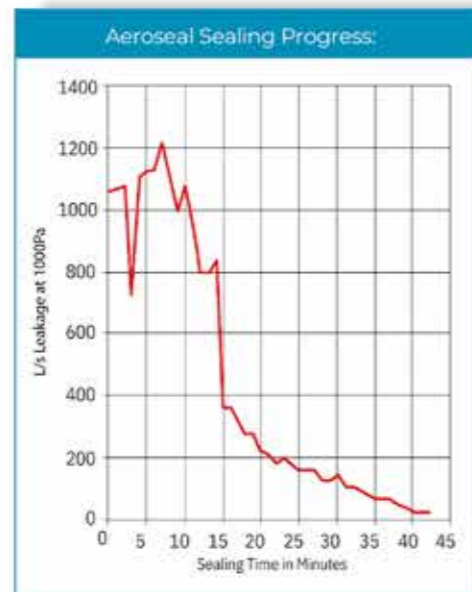
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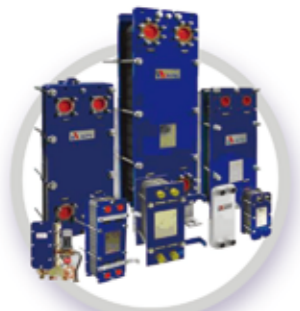


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# The Impact of Low-GWP Refrigerants on the Size and Coefficient of Performance (COP) of Chillers

Kelvin Tse

## Introduction

Chillers play a crucial role in HVAC systems by providing cooling solutions for various applications. Hydrofluorocarbons (HFCs) have been widely used as refrigerants in chillers for many years. However, due to their high global warming potential (GWP), there is a push towards using low-GWP refrigerant such as HFOs as a more environmentally friendly alternative.

In response to the phase down of high-GWP refrigerants such as R-410A and R-134a, chiller manufacturers have developed a variety of chillers with low-GWP refrigerant. Most manufacturers offer chillers with R-1233zd(E), R-1234ze(E) and R-513A to replace the ones with high-GWP refrigerant.

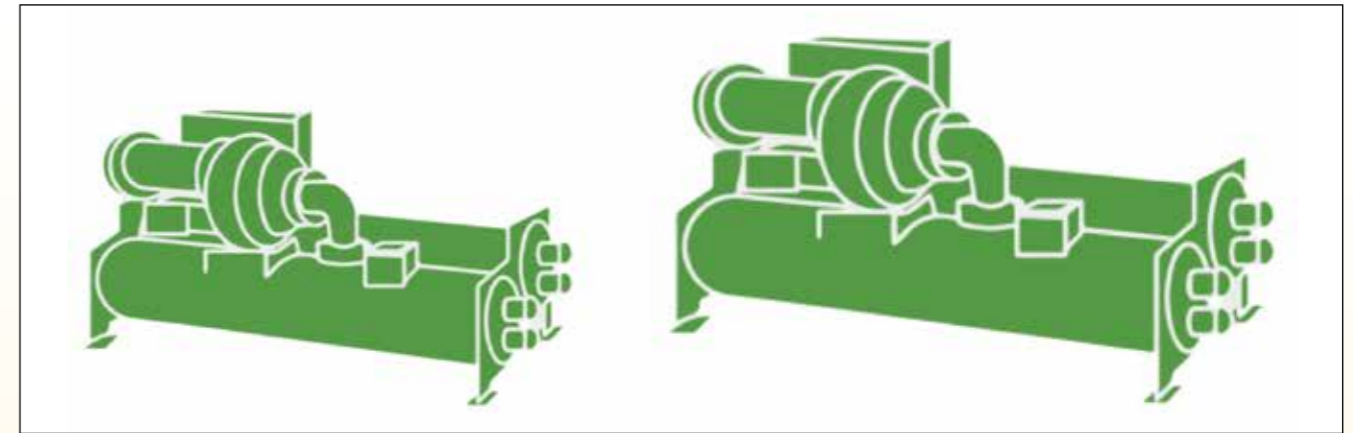
While HFO chillers offer benefits in terms of lower GWP, they also come with certain drawbacks, particularly in terms of overall size and Coefficient of Performance (COP).

Refrigerant	ASHRAE Safety Classifications	Charateristics	Chiller
R-134a	A1	Medium Pressure	Positive Pressure Machine
R-1233zd(E)	A1	Low Pressure	Negative Pressure Machine
R-1234ze(E)	A2L	Medium Pressure	Positive Pressure Machine
R-513A	A1	Medium Pressure	Positive Pressure Machine

## R-1233zd(E)

R-1233zd(E) is a hydrofluoroolefin (HFO) refrigerant and is classified as an A1 refrigerant, which is widely accepted for centrifugal chillers. One of the key characteristics of R-1233zd(E) is its low pressure feature for negative pressure chiller design. It can only be used in centrifugal chillers and is not suitable for screw chillers. The density of R-1233zd(E) is five times smaller than R134a. Due to its lower density, its mass flow rate will also be significantly lower than R-134a. The heat transfer rate in the evaporator is a function of refrigerant's mass flow rate and specific heat. For R-1233zd(E), both these parameters are lower compared to R134a. The relative reduction in COP for R-1233zd(E) as compared with R-134a is 17% [3].

To overcome the drawback of R-1233zd(E) and the negative pressure characteristics, a larger chiller must be selected. This means that R-1233zd(E) chillers need to have larger heat transfer surfaces and components to achieve the same level of cooling capacity as R-134a chillers. As the new developed chiller, it is not just chasing the performance of R-134a. Manufacturers tend to take a big step to achieve higher COP. Hence, the new R-1233zd(E) chillers have been launched. The footprint is around 30% larger than conventional R-134a chiller. This is the key challenge for using R-1233zd(E) in the coming projects, especially in chiller replacement projects.



## R-1234ze(E)

R-1234ze(E) is also a hydrofluoroolefins (HFO) refrigerant that is non-ozone depleting and has a very low GWP. It is classified as A2L refrigerant due to the slight flammability characteristics. Besides of the disadvantage of slightly flammable, it's low GWP as 4 and the positive pressure feature is a good solution to replace R-134a for screw chiller and centrifugal chiller.

From the study of direct drop-in replacement of R-134a with R-1234ze(E) in screw chiller at the same size of chiller and the same operating condition. The value of the overall heat transfer coefficient for R-1234ze(E) is very similar to that of R-134a. However, the rated cooling capacity is significantly reduced by about 25%, because of the lower volumetric capacity of R-1234ze(E) as compared to R-134a [4]. A higher volume of R-1234ze(E) has to be circulated to obtain the same cooling capacity. This means a larger compressor must be used.

For chillers suitable for drop-in refrigerant, the lubrication oil and gaskets may also be replaced together.

## R-513A

R-513A is a blended refrigerant consisting of HFO and HFC components and classified as A1 refrigerant, designed to have a GWP below 600, significantly lower than R-134a's GWP of 1430. The lower GWP of R513A makes it a more environmentally friendly alternative, aligning with global initiatives to reduce greenhouse gas emissions. Additionally, R-513A has similar thermodynamic properties to R-134a, making it a viable replacement of chiller in many existing systems without requiring significant modifications.

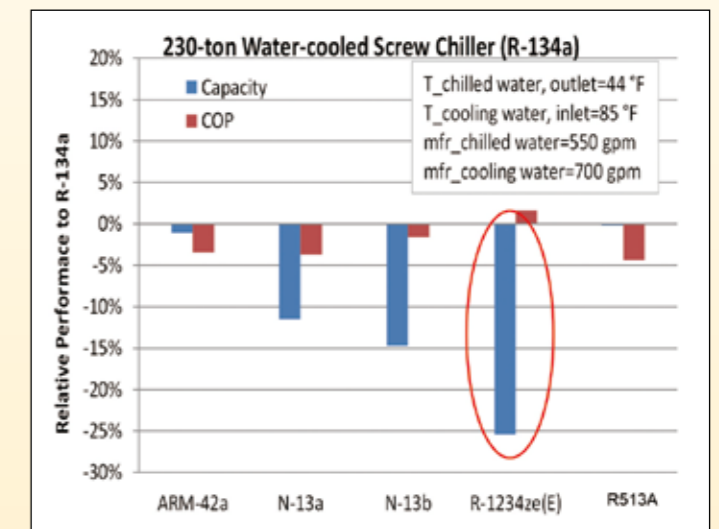


Fig.1 Performance comparison of low-GWP refrigerants was dropped into R-134a screw chiller [1]

R-513A as the positive pressure refrigerant, it can be applicable to both centrifugal and screw chillers. When comparing the performance of R-513A and R-134a chillers, several factors need to be considered, including energy efficiency, cooling capacity, and coefficient of performance (COP). In terms of performance, both R-513A and R-134a offer efficient cooling solutions. R-513A chiller has shown similar cooling capacity to R-134a chiller. However, the energy efficiency with R-513A has 4.5% slightly lower than R-134a [2]. The reduction of COP using R-513A resulting some minor differences in the design of components to optimize performance. These differences do not cause a big impact to the overall size of the chiller system.

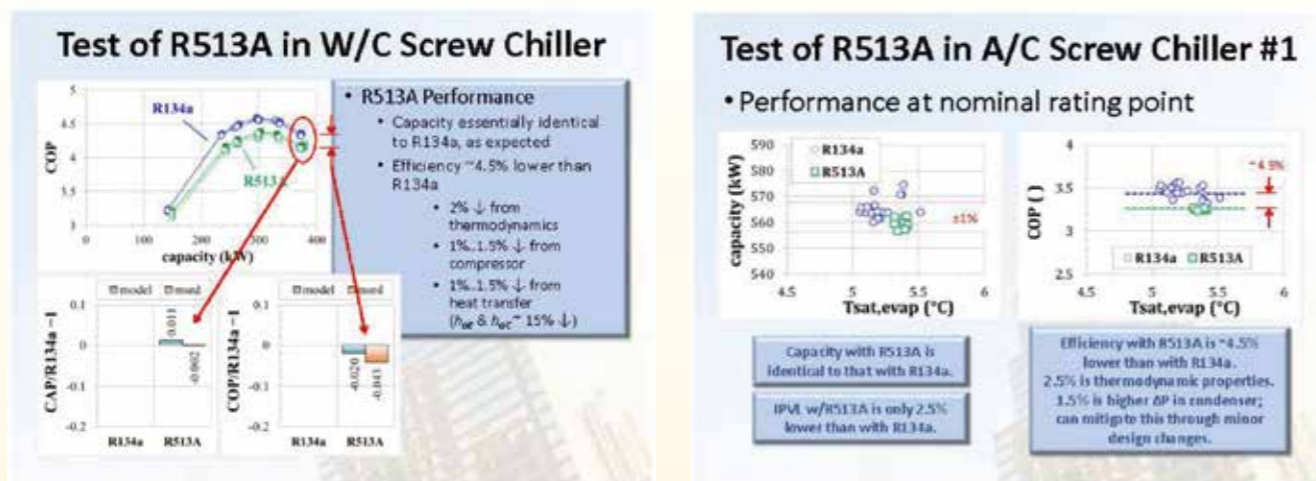


Fig.2 Performance comparison of R-513 and R134a in screw chiller [2]

**Summary**

While low pressure HFO refrigerants like R-1233zd(E) offer environmental benefits over conventional HFCs R-134a, it is essential to consider the reduction in cooling capacity and COP drop that may occur when using these alternatives under the same footprint of the R-134a chiller. To keep the efficiency, chiller manufacturers have developed new chillers with a larger chiller footprint. As a result, the new R-1233zd(E) chillers often require more space for installation, which will be a challenge in retrofit projects or when space is at a premium.

For the limited space environment, the positive pressure refrigerant like R-513A may be a good choice for chiller with its compact footprint. The performance of R-513A in chiller application, particularly in terms of cooling capacity, energy efficiency and overall size, is comparatively similar to R-134a. The adoption of R-513A combined with its compatibility with existing systems, makes it an attractive alternative for clients looking for compliance with regulations and reduction in carbon footprint.

**Reference**

[1] AHRI Low-GWP AREP Report 007, 2012  
 [2] AHSRAE Winter Conference in Orlando, Conference Paper Session 5, 2016  
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 [4] Censi, Giuseppe and Padovan, Andrea, "R1234ze(E) As Drop-In Replacement For R134a In A Micro-Fin Shell-And-Tube Evaporator: Experimental Tests And Calculation Model" (2021). International Refrigeration and Air Conditioning Conference. Paper 2164.



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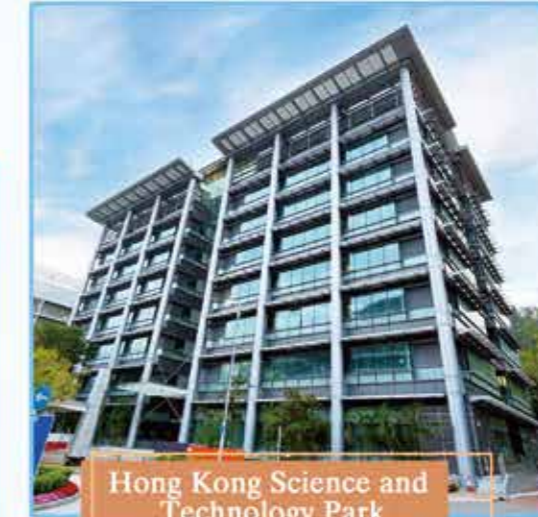


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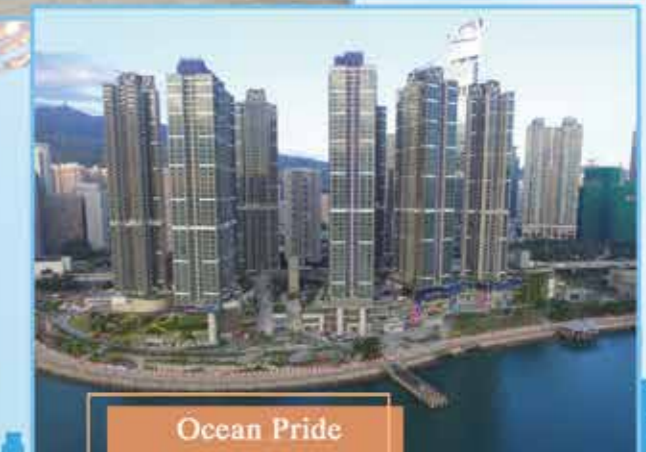
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## 人物專訪

## 跨界築夢：羅淦昌工程師 (Ir Gilbert LAW Kam Cheong)

羅淦昌工程師 (Ir Gilbert LAW Kam Cheong)，剛退下太古地產管理核心火線，他的職場軌跡從機械工程師起步，憑藉不懈的努力和對細節的敏銳洞察，逐步成為項目掌舵者。在商業大樓、商場、酒店甚至機場和藥廠等多元化項目中，羅工程師都留下了自己的足跡，特別是在隧道工程方面的深厚造詣，為他的職業生涯增添了一抹獨特的色彩。

## 學習與起步

羅工程師的求知之路從加拿大的校園起步，那裡他不僅吸收了機械工程的專業知識，更培養了對創新和效率的深刻理解。學成歸來，羅工程師加入了一家澳洲工程顧問公司的香港分部，開始了他的空調設計學習之旅。隨後，他轉戰到一家華資工程顧問，負責澳門總統酒店的空調系統設計，將舒適與效率完美融合。經過兩間工程顧問公司磨練後的羅工程師，已逐漸展現他在工程設計上的才華。

## 職涯轉捩點

時間流轉，羅工程師加入了享有盛譽的禮信工程顧問有限公司 (J. Roger Preston Limited, 簡稱JRP)。在這裡，他參與了匯豐銀行總行的重建工程，擔任現場監管的重要角色。當中要為一條深入地下六十米以連接至中環海旁的隧道，安裝海水散熱喉管工程，每次進出都要經豎井，加上隧道建築期時積水及膝，工作環境的惡劣實不足為外人道。這條隧道考驗了他的專業技能和項目管理能力，也是他職業生涯中的亮點。此外，羅工程師也參與了JRP在國內的第一個酒店工程項目，位於北京的“香山飯店”，此酒店由著名建築師貝聿銘先生設計。這個項目的特殊性在於，除了要設計高效的空調系統，還需考慮中央暖氣的需求，這對羅工程師而言，無疑是一次技術和經驗上的躍進。

## 跨界挑戰：從電話機樓到環保工廠

在顧問工程公司累積了豐富的經驗後，羅工程師轉戰電話公司，他負責的電話機樓項目需要將傳統的機電系統更新為數碼化系統，這在當時是一項前所未有的挑戰。他不僅要確保系統的穩定運行，還要考慮成本效益和未來的可擴展性。羅工程師的跨界之旅從未停歇，甚至到移居加拿大後，他更是涉足了環保領域，參與了藥廠和環保工廠的設計和建設，這些計畫不僅要求他具備傳統的工程知識，還要有對環境科學和可持續發展的深切理解。

## 重點項目：香港國際機場與又一城商場

在1993年，羅工程師攜著國際經驗與深厚的技術積累，回到了香港，並加入了赤鱗角機場（即香港國際機場）的核心工程顧問團隊，擔綱首席工程師的重要角色。他帶領團隊打造了一個領先亞洲的客運大樓，這項計畫要求他全面考慮機場的運作流程，包括寵物入境的隔離設施。為了進一步優化設計方案，羅工程師也特別前往啟德機場進行實地考察。在客運大樓的機電設計領域，羅工程師面臨了一系列重大挑戰。然而，他憑藉著在專業領域的精湛技藝和創新思維，成功地引領團隊逐一解決了這些難題。這座設計獨特的建築最終不僅成為了當時國際頂尖機場客運大樓，也成為了羅工程師職業生涯中一個顯著的里程碑。

由機場跑道起飛，降落太古地產，羅工程師迎來另一個挑戰“九龍塘又一城商場發展項目”。這個項目包括一幢辦公大樓、一百萬呎商場和當時全港最大溜冰場，整個項目規模宏大，設計複雜，加上七千噸的空調製冷系統、不規則的商場中庭、溜冰場冰層的製造和上方玻璃冷凝霧化的影響，以及機電和消防系統的複雜性，都考



驗著羅工程師的專業能力，也為工程項目帶來了額外的挑戰。羅工程師不僅要解決這些技術難題，還要滿足各大租戶各式各樣的需求，這無疑需要他投入巨大的心血和時間。

## 創新與傳統的融合

在又一城計畫取得成功後，羅工程師從機電項目經理飛躍成為整個項目負責人。他的首個重要任務是領導金鐘太古廣場第三期，這是該公司首次參與水冷空調先導計劃的項目。言而最深刻的挑戰並非機電設施，而是建造一條連接金鐘地鐵站與太古廣場三期的隧道。儘管成功說服鐵路公司協助申請增撥土地，但工程仍需多個政府部門的審批，甚至需要到中西區區議會向議員說明隧道對公眾的好處，但往往真正的考驗在於獲批之後才開始。隧道雖短，但所經之地為交通要道，無法封閉施工，且地下花崗岩層堅硬，需用炸藥爆破，每天僅限中午一分鐘。工程團隊還需協調週邊住宅、行人和交通，隧道最終耗時一年多才貫通。更在完成後發現其他工程造成的溶洞問題，需額外灌漿處理。經過種種困難，隧道在大樓入伙兩年後終於完工，不僅便利了太古廣場三期的租戶，也惠及了灣仔地區的居民。

在2008年落成的港島東中心 (One Island East) 項目中，羅工程師引入了預製組件和以BIM模式運作的軟體，這在當時是一大創新突破，使項目按時完成租戶如期進場，幫助公司在金融海嘯期間保持了租賃市場的穩定。

除新發展項目外，羅工程師還負責為公司現有物業增值。金鐘太古廣場商場翻新時，與國外設計師合作，構思了創新的透明行人路面等元素。雖然最終設計有所調整，但包括透明玻璃升降機、精心挑選的歐洲石材和全銅製扶手等設計，在未對租戶造成影響下，讓商場煥然一新。在金鐘的服務式住宅轉型為高級精品商務酒店的項目中，羅工程師展現了他對專業要求和美學眼光的精準把握。從最初考慮與歐洲奢侈品牌合作，到最後決定使用自家品牌，羅工程師的決策和領導確保了項目的高標準和獨特性。

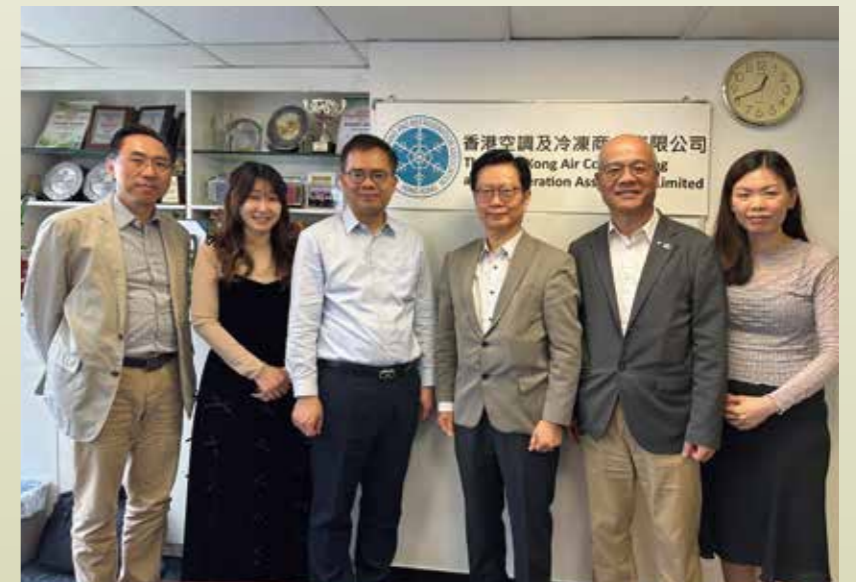
## 專業貢獻，創新驅動

貴為香港工程師學會的資深會員，羅淦昌工程師不僅在消防分部和屋宇裝備分部擔任過主席，還曾在理工大學擔任講師，在推動工程專業發展上同樣不遺餘力。他的貢獻不僅限於技術層面，更在於對後輩的培養與引導。

在工程界，羅工程師以其對創新的追求而聞名。他積極引入人工智能 (AI) 和BIM技術，不僅提高了設計和施工的效率，也提升了項目的品質和安全性。他所領導的工作小組開發了多個創新工具和流程，這些成果不僅在公司內部得到了廣泛應用，還在業界產生了深遠的影響。

## 不斷探索，永不止步

羅淦昌工程師的不斷探索和勇於創新的故事，不僅為工程界樹立了一個不斷學習、勇於創新的典範。他的每一次跨越，都是對自我極限的挑戰，對未知領域的探索。他以身教告知每一位年輕工程師，無論時代如何變遷，對工程的熱愛和對創新的追求永遠不會過時。勇敢地跨越界限，不斷地追求卓越。未來的工程界將會更加精彩，更加充滿活力。







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**Project Name**

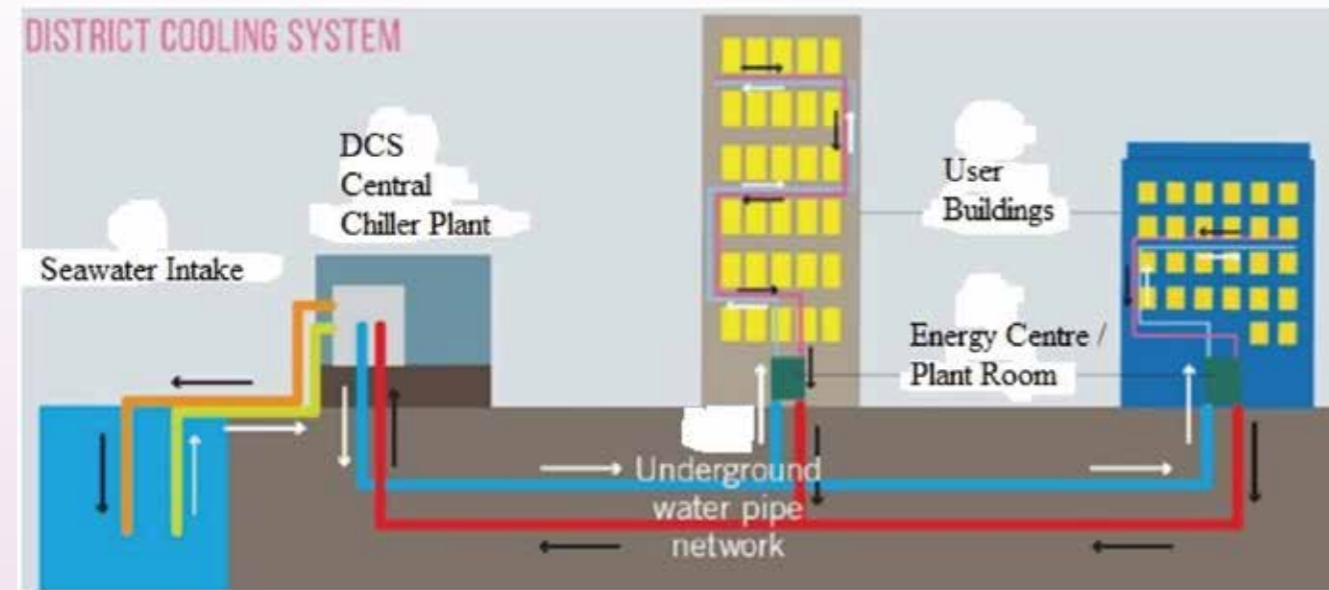
**District Cooling System (DCS) at Kai Tak Development (KTD) Phase III R Electrical and Mechanical Installation at Site 1D3**

**Prepared By**

**Daniel CHONG** FHKIE / DSC(V) / RPE/REA

**Alec SOO** LP

**Anthony CHAN** MHKIE / RPE



**Members' Role In this A&A Project**

- Heat Exchangers
- Underground and Plant MVAC pipework
- Underground Pipework Water Leakage Detection System
- District Cooling Instrumentation Control and Communication Systems (DCICCS)

**Completion Year**

2023 (Energy Centre / Energy Plant of similar nature is on going till end of 2025)

**Member / Company Name**

Winston Air Conditioning & Engineering (HK) Company Limited

**Background**

The Kai Tak District Cooling System was substantially completed in 2021 which consists of two central water-cooled chiller plants, namely North Plant (NDCS) and South Plant (SDCS) with total capacity of 81,000RT, comprised of seawater pump house and underground chilled water distribution piping network of some 40km, designed to supply chilled water for clusters of buildings over the span of some 320 hectares.

For buildings adopting the DCS, an energy center/plant room shall be constructed at U/G or ground level of their establishment to convert the chilled water supply system for their application by means of the heat exchangers and the secondary chilled water pumping system. The chilled water supply underground piping

network, as constructed, has included a number of tee-off valves pits at strategic locations for the needs of the user buildings joining the DCS scheme. A number of A&A work for supply & installation of the Heat Exchangers and the associated pipework, Water Leakage Detection System as well as the DCICCS for these energy centers / plant rooms has been completed and/or under construction. As the area around is on-going with new development, it is estimated that the opportunity for contract work of a similar nature will be continued for a considerable period of time.

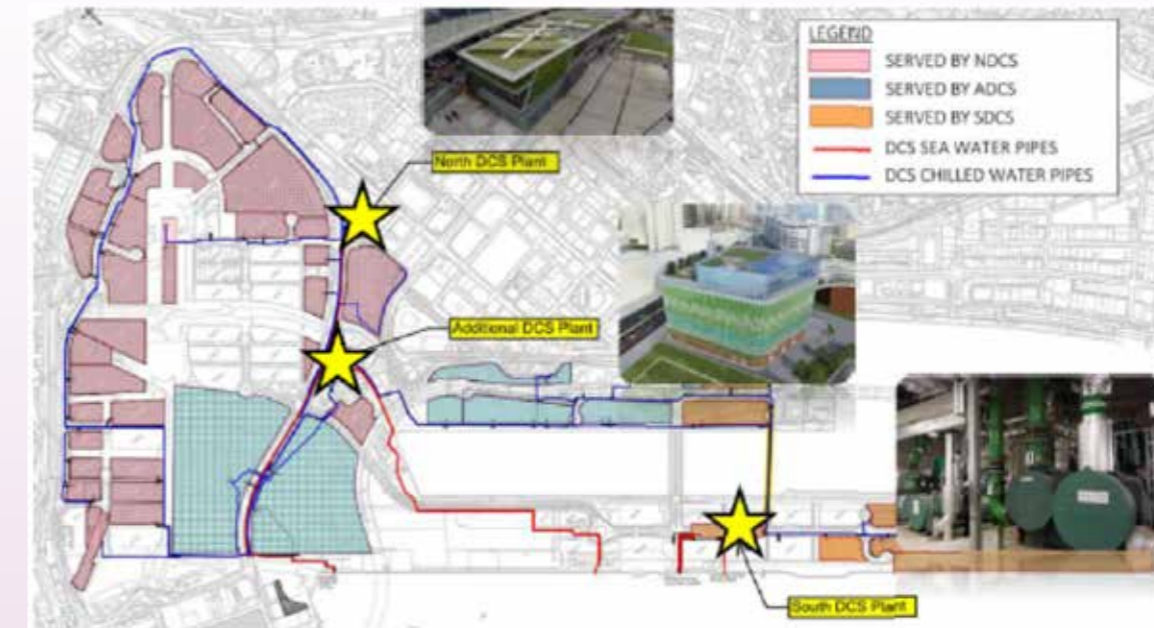


Figure 1. Map for District Cooling System

**Underground Pipe and Energy Centre / Plant Room Provisions**

For each of the establishments, there are 3 numbers of underground chilled water pipes ( supply / return / stand-by ), sizes from 150mm to 600mm, terminated in the valve pits ready for connection. The underground pipe is of pre-insulated PU foaming black steel pipe completed with water leakage cabling and HDPE cladding.



Figure 2. 3-pipe System of Underground Chilled Water Piping of KTD DCS



Figure 3. Heat Exchangers Installation

A control panel for the water leakage system and a DCICCS are equipped within the plant to perform all necessary local control functions and to complete the entire looping system for remote control and monitoring for an optimum and energy efficient operating conditions to suit the cooling load demand of the concerned building at all times.

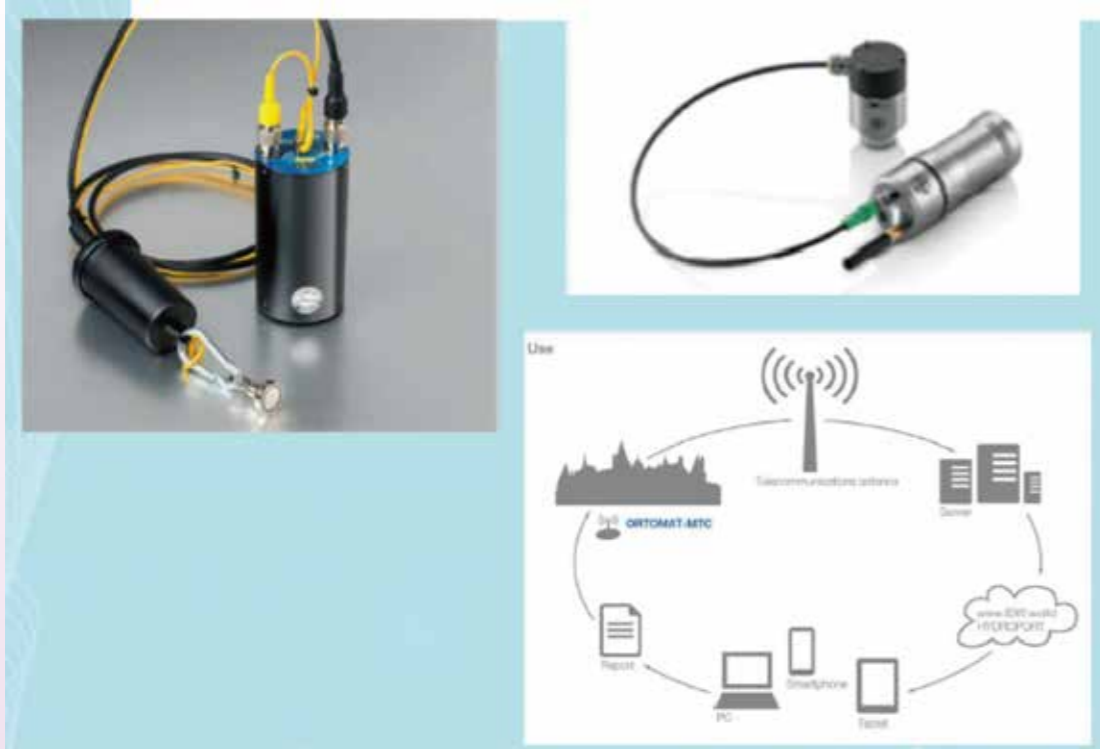


Figure 4. Water Leakage Detection System

**Project Experience Sharing**

The nature of this A&A work involves a substantial amount of external underground pipework and a number of energy center/plant rooms constructed by different Main Contractors as well as the connection process to the existing DCICCS, Water Leakage System and the DCS. A great deal of effort is required on the coordination, area ready / suitable for work, material delivery, welding and joints inspection, testing and commissioning leading to the handover joint inspection with the DCS management representatives. It is indeed the pleasure of the entire engineering team for having the opportunity to participate in such a sophisticated A & A project.

The following are the photos U/G pipe welding, inspection, water leakage cabling joints, HDPE welding and on-site PU foaming, works are demanding and complicated but are worth lifelong operations.



Figure 5. Electro-fusion Joint for PU Foaming



Figure 6. Electro-fusion Joint for HDPE Welding



Figure 7. U/G Pipe Welding



Figure 8. U/G Water Leakage Cabling Joints

**Conclusion**

Thanks HKSAR in the implementation of the DCS in mapping the climate action plan for 2030+, upon fully utilization, it is anticipated that some 35% of electricity consumption can be reduced for the DCS over the conventional air-cooled system which means for annual reduction of electricity consumption of 138 million kWh/Year and is about 59,500T reduction on CO<sub>2</sub> emission.



Figure 9. Hong Kong's Climate Action Plan 2030+

**Reference**

1. Winston Air Conditioning & Engineering (HK) Company Limited (2024) **Project Control Document**.
2. Yeung, K., Lung, F., Cheng, V., & Kam, G. (2021) **The Challenges and Development of District Cooling System (DCS) in Hong Kong, New Generation and Technology Application for Future Engineering Challenge Hong Kong Joint Symposium 2021**, Hong Kong, 17 November 2021.

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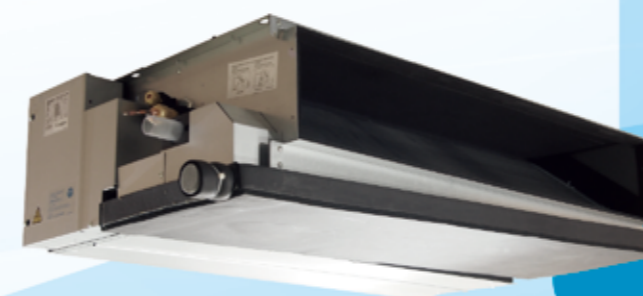
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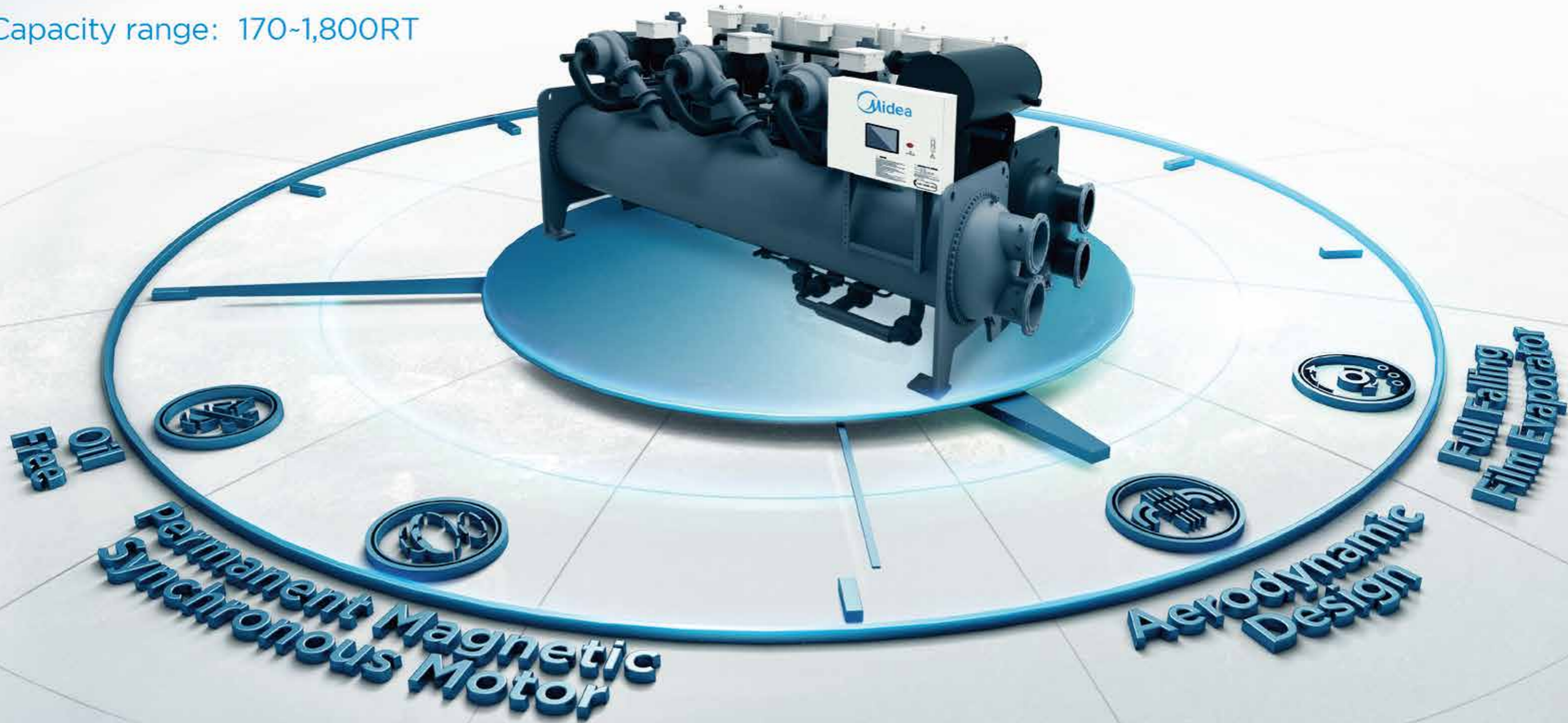
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## Industry News – Standard and Testing Requirements in E&M Materials : Zinc Coating

The Architecture Services Department (ArchSD) issued a Corrigendum No.GSBS01-2022 to incorporate updates and revisions to the General Specification for Building Services Installation 2022 Edition. The material and equipment specification in Section 7.2 are revised in this Corrigendum included adding new paragraph on the manufacturing requirement for steel trunking, standard BS EN10346:2015 for the Zinc coating and testing requirements for protection against corrosion.

The General Specification incorporated with the Corrigendum applies to all tenders were / to be invited on or after **1 March 2024**.

In this corrigendum, a new paragraph in Section 7.2.2.4.1 is added to manufacturing of steel trunking for complying with ISO 9001:2015 and valid certificate issued within 3 years shall be submitted before material delivery to site. In Section 7.2.2.4.2, requirement of certification body test of trunking materials is added and the test report of zinc coating in BS EN10346:2015 in this batch is required to be attached with delivery note. Furthermore, on-site non-destructive sample tests by coating thickness gauge as specified in BS EN ISO 2178:2016 shall be conducted as part of the inspection and acceptance procedures.

ArchSD also intended to apply similar requirements to other materials with Zinc Coating in E&M trades including G.I. sheet materials for air duct. ACRA was invited to discuss on this issue focusing on: 1. Quality control in materials manufacturing; 2. Tractability of test certificate and 3. Site inspection. We had invited major sole agents of G.I. Sheet materials to provide comments on these requirements before for discussion with ArchSD. After subsequent meetings with ArchSD, we proposed the following amendments items for their consideration:

1. Manufacturer of G.I. sheet materials should be accredited to ISO9001 and the certification has to be renewed every 3 years;
2. The ductwork shall be fabricated from quality full sized Zinc coated hot dipped galvanized flat steel sheet to BS EN10346:2015, Grade DX51D+Z coating type Z275. The Zinc coating mass shall be tested to either ISO1460 or BS EN10346 under HOKLAS of the HKAS or an organization accredited by an accreditation body mutually recognized by HKAS.
3. The test results of manufacturer (Mill Cert.) according to either one of the standards shall be traceable with clear identification in the label adhered on air duct / fitting indicating that the material tested is of the same batch as material used for the project.
4. Three samples in one lot ductworks should be tested on-site by coating thickness gauge (elcometer) as specified in BS EN ISO 2178:2016 shall be conducted as part of the inspection and acceptance procedures for coating of air duct. All the ductworks would be rejected if any one of the samples failed in the on-site test.



## Revised Code of Practice for Safety and Health at Work in Confined Spaces

The Labour Department (LD) published a revised Code of Practice for Safety and Health at Work in Confined Spaces (CoP) in the Gazette on 31 May 2024 to enhance the safety and health in confined spaces work.

The major revisions of the CoP include :

1. the enhancement of requirements for proprietors' or contractors' supervision on confined space work;
2. highlighting the factors for assessing whether a particular job constitutes underground pipework;
3. adding a detailed template of the risk assessment form and listing out the setting of an air-monitoring alarm; and
4. the update on the Permit-to-work Certificate template.

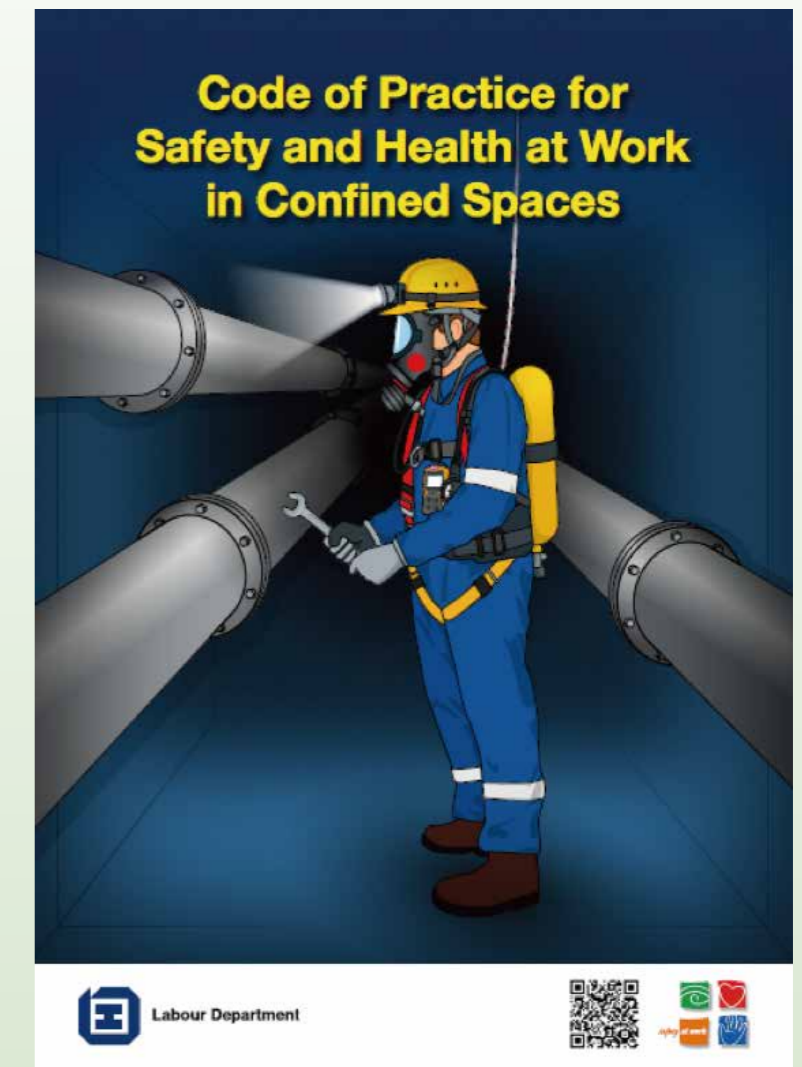
The revised CoP also requires proprietors or contractors to adopt technology to *record videos at the entrance and exit of the confined space throughout the entire work period to monitor relevant personnel's compliance with the safety precautions and to keep the record.*

Considering the time required for the industry to furnish suitable equipment and make necessary arrangements for implementing all safety precautions, there will be a six-month grace period. It will take effect on November 30 to allow the industry to have sufficient time for preparation."

The CoP provides proprietors, contractors, competent persons and certified workers with practical guidance and technical information to comply with the requirements set out in the occupational safety and health legislation regarding confined space work for safeguarding the safety and health of workers.

This CoP has a special legal status. In **criminal** proceedings, if a relevant person fails to observe any provision of this Code, that failure may be taken by the court as a relevant factor in determining whether or not a person has breached the relevant safety and health legislation.

The revised CoP can be downloaded from the LD website: [www.labour.gov.hk/eng/public/content2\\_8b.htm](http://www.labour.gov.hk/eng/public/content2_8b.htm).



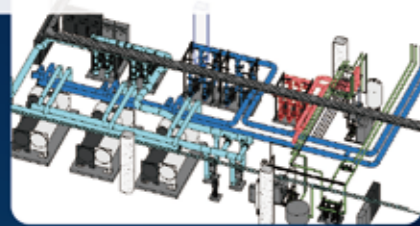
# Grundfos Smart Pumps Maximising Efficiency through IoT Integration

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## OPERATION & MAINTENANCE



### IoT Integration and AI Analytics

#### Built-in IoT Connectivity

- Real-time monitoring of flow, pressure, energy consumption, temperature, etc.

#### AI Analytics

- Cloud-based platform using machine learning for predictive maintenance and energy optimisation



How it works



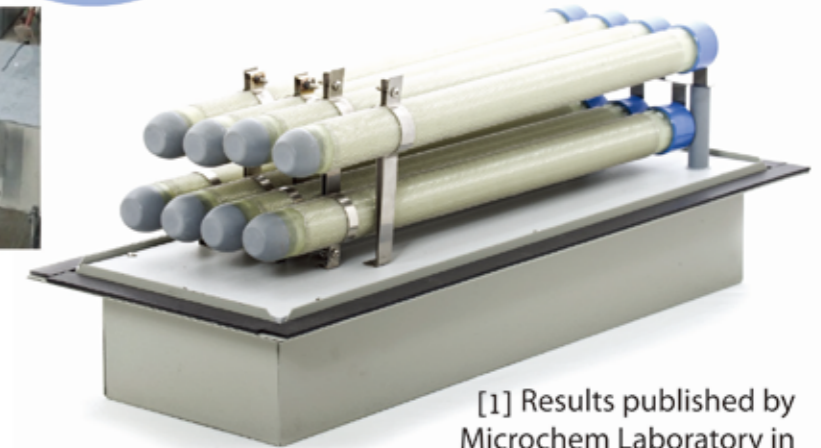
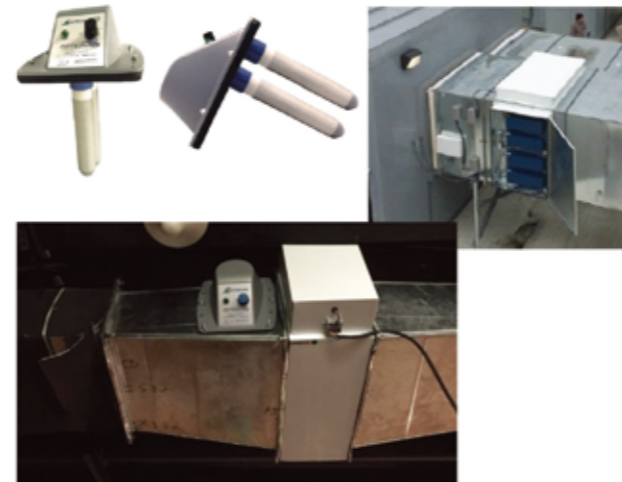
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[1] Results published by Microchem Laboratory in Texas USA

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# The Challenges of CO<sub>2</sub> Sensing

We spend most of our lives indoors – at home, in the office or out visiting shops, restaurants and other public venues. As fresh air becomes a precious commodity, it is important that buildings are properly ventilated. CO<sub>2</sub> levels have long been used as an indicator of indoor air quality, which is why many modern HVAC systems are equipped with CO<sub>2</sub> sensors. However, in order for these sensors to be accurate, there are many factors that must be considered and addressed.

## Lack of Fresh Air

The health benefits of fresh air are irrefutable, and the lack of it affects our health and the ability to focus. Unfortunately, in this busy world, few of us are able to spend as much time outdoors as we might want to. On average, we spend up to 90% of our lives indoors, and most of that time we reside in our homes. Even though we leave our houses regularly, a lot of the time spent outside the home is in another indoor location, such as an office, restaurant or shop. This clearly shows the importance of high quality indoor air and proper monitoring of CO<sub>2</sub> levels, especially in crowded venues.

## Impact on Health and Productivity

Although high levels of CO<sub>2</sub> and bad air quality are not synonymous, raised concentrations of CO<sub>2</sub> can be a good indication that the room requires additional ventilation. In addition, an increase in CO<sub>2</sub> often comes hand-in-hand with a rise in volatile organic chemical (VOC) concentrations, as both are emitted by humans. It is commonly known that bad air – especially high VOCs – can be detrimental to health and increase the risk of transmission of airborne viruses, such as SARS-CoV-2. Additionally, a lack of fresh air also has a great impact on productivity and the ability to focus – a claim that is backed up by numerous studies.

## Demand Controlled Ventilation

Extremes are never good, and this is also true for ventilation. HVAC systems that are constantly working at maximum capacity will lead to high energy consumption and, consequently, exorbitant electricity bills, especially during very hot or cold periods. It is therefore not a surprise that demand-controlled ventilation is currently seen as the gold standard for HVAC systems (Figure 1), and the CO<sub>2</sub> concentration is often used as a control parameter, as it correlates closely with air quality. This application relies on sensors providing accurate information on CO<sub>2</sub> levels, activating the system when a specified limit has been reached. Although comfort norms vary around the world, there is a consensus that the CO<sub>2</sub> levels should always be kept below 1,000 ppm (Figure 1), and not exceed 1,500 ppm for long periods. A good compromise is to measure and adjust the CO<sub>2</sub> levels every 30 seconds, which keeps the air fresh and the energy bills low.

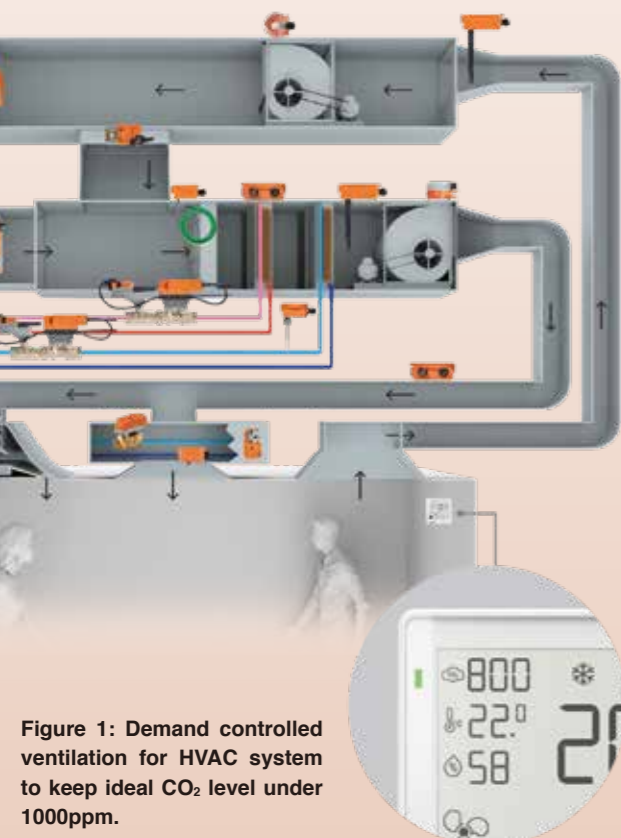


Figure 1: Demand controlled ventilation for HVAC system to keep ideal CO<sub>2</sub> level under 1000ppm.

## Dual Detector Approach

A common CO<sub>2</sub> sensor design consists of a light source and two detectors (Figure 2). As light passes through the measurement chamber, filled with ambient indoor air, it is absorbed by the molecules present. One detector has a filter with a window at around 4.3 μm – which corresponds to a peak in the CO<sub>2</sub> absorption spectra – meaning it only registers extinction of light due to the presence of CO<sub>2</sub> molecules. In contrast, the reference detector measures the unfiltered light intensity, making it possible to determine the CO<sub>2</sub> level by comparing the two measurements. The dual sensor design also helps to counter the drop in light intensity originating from light source degradation or small dust particles. To further enhance the robustness of the sensors, they should be fitted with a dust cover that stops particles from interfering with the detectors.

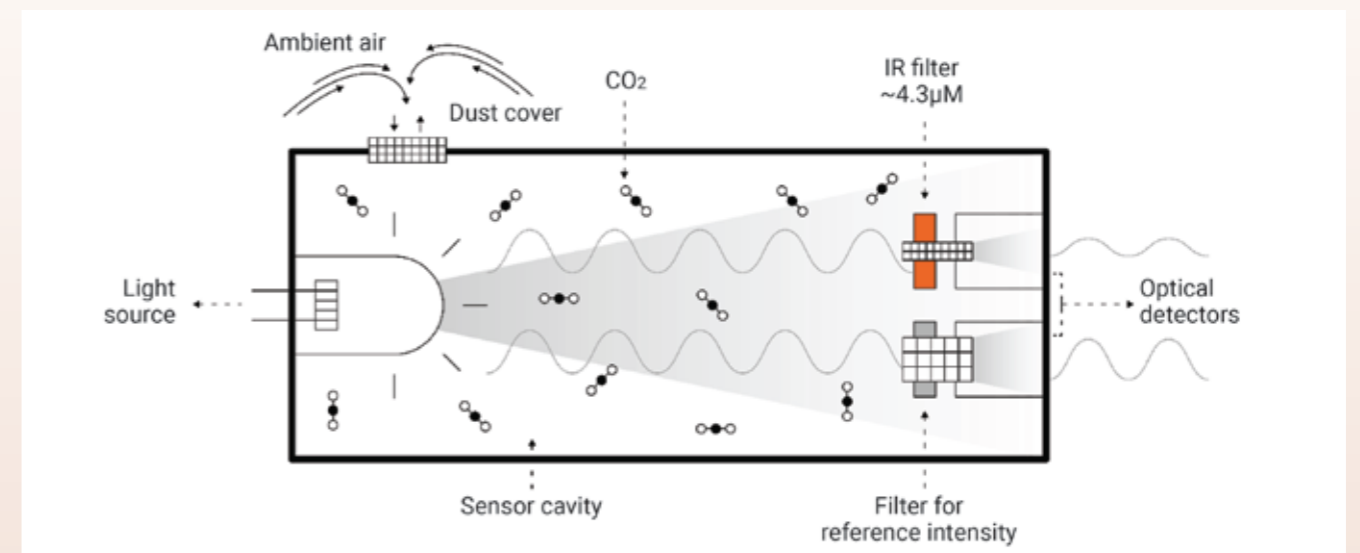


Figure 2: Visualisation of the NDIR dual detector approach.

## Long-Term Stability

Although the dual channel approach is considered to be accurate, it alone cannot guarantee stable long-term measurements, as the baseline can start to drift over time due to aging of sensor components. This can be fixed through automatic baseline correction (ABC), which constantly tracks the sensors lowest reading, and corrects for any drift that is detected. This approach works well for buildings that are unoccupied for periods of time such as offices that are closed during the weekend. However, this drift is not as easy to identify and address in venues that are occupied 24/7, for examples hospital emergency rooms, logistic centres or factories. It is therefore crucial to use robust sensors that provide accurate long-term measurements without the need for constant calibration, allowing them to be used in all applications, regardless of occupancy patterns (Figure 3).

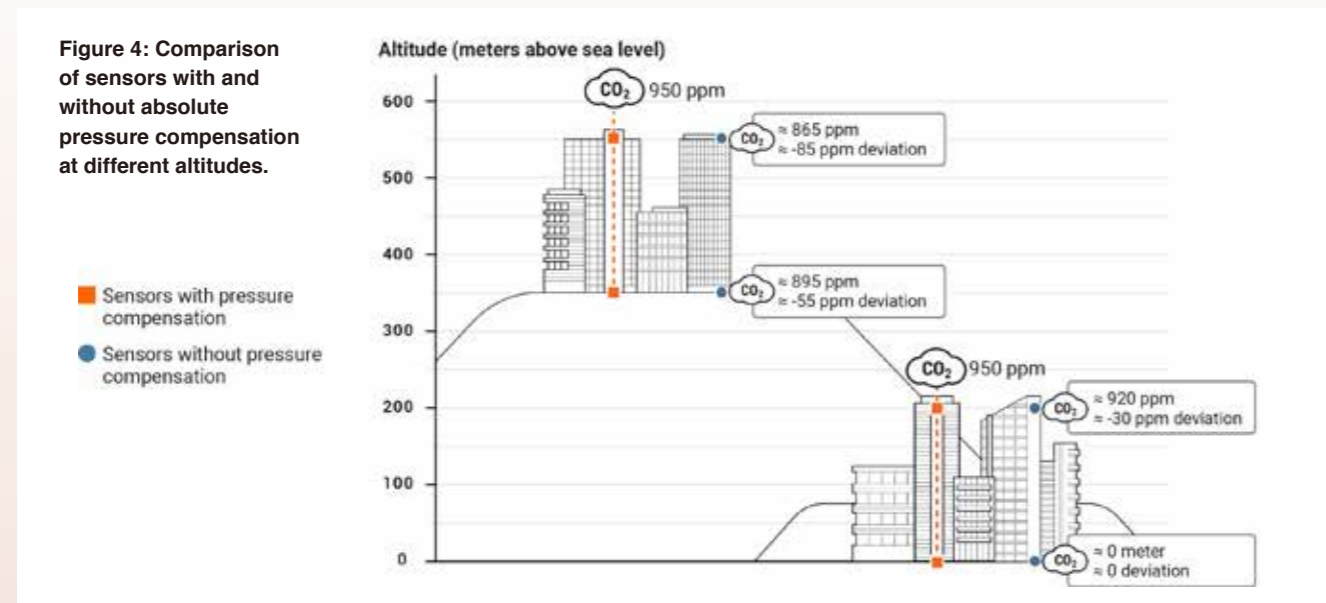


Figure 3: Dual-channel self-calibration technology enables the use of CO<sub>2</sub> sensors in all buildings and applications, even where the ABC method cannot be used.



## Under Pressure

A room sensor needs to be able to accurately measure CO<sub>2</sub> levels under any conditions, which means it needs to have a good resistance to both gradual and acute changes in pressure, temperature and humidity. The pressure differences at different altitudes also need to be accounted for, as even an elevation of 400 m above sea level results in a 70 ppm offset in the measured CO<sub>2</sub> concentration. Considering that some regulatory bodies – for example several state governments in the USA – only allow a tolerance of  $\pm 75$  ppm, this leaves almost no margin for error. Any high performance CO<sub>2</sub> sensor should therefore include absolute pressure compensation (Figure 4).



## Testing and Verification

Extended testing should be performed to ensure that the sensor can operate under various conditions in order to guarantee long-term stability and function. Sensors should therefore be tested for an extended period – spanning a number of weeks – covering all possible weather conditions and focusing on those known to put a lot of stress on the device. For example, non-condensing wet heat performance can be tested at 95% relative humidity and 35°C to ensure the sensor exhibits corrosion resistance and can maintain its performance. On the other hand, dry heat measurements should be performed at higher temperatures – 60-70°C – to confirm that no drift occurs due to the difference in expansion coefficients of the materials. As internal temperature gradients can also play a role in the overall device performance, the sensor elements must be built in a way that minimizes self-heating.

## Summary

As we spend more and more time indoors, it is becoming increasingly important to monitor indoor air quality, which can successfully be done by surveying the CO<sub>2</sub> levels. Many organisations are therefore choosing HVAC systems that regulate airflow based on the levels of CO<sub>2</sub>. However, in order to deliver the correct amount of air without over-ventilating, these systems need to be equipped with reliable sensors. Even though most sensors are accurate initially, they can prove to be unstable in the long run, requiring frequent recalibration. This approach can be effective in some settings, but does not work in constantly occupied venues. It is therefore beneficial to choose robust sensors that can provide correct measurements without constant adjustments of CO<sub>2</sub> under virtually any condition for indoor air quality applications.

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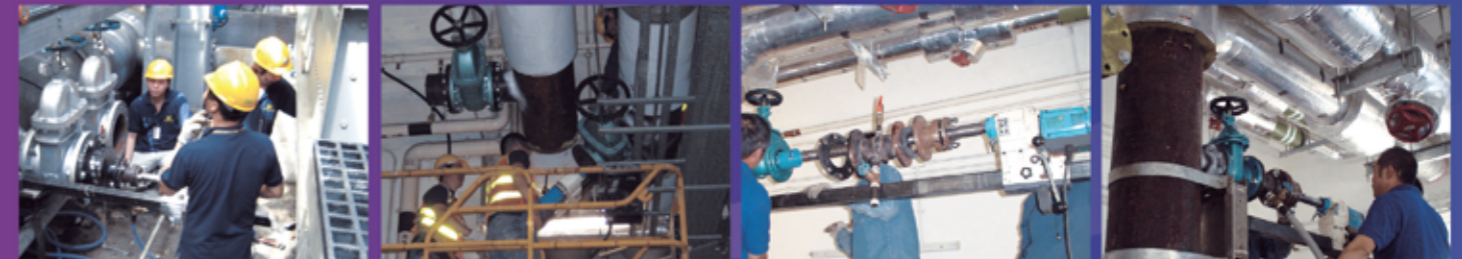


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## ACRA, CIBSE-HKB and HKAEE 中國製冷展交流訪問團2024

第35屆國際製冷、空調、供暖、通風及食品冷凍加工展覽會（簡稱2024中國製冷展）於2024年4月8日至11在中國北京國際展覽中心（順義館）順利舉辦。本年度製冷展的主題是“數智賦能拓賽道，穩基強鏈促共贏”，以國際化、專業化、智能化為主要特點，充分整合了推動行業發展新質生產力的各類資源。

展會期間成功舉辦開幕典禮暨主題論壇、38專題研討會、20場技術交流會，充分探討了行業政策和前沿趨勢，並在官網、視頻號、抖音等平台進行直播。時隔六年再回到北京，本屆中國製冷展受到了廣泛關注，1000餘家國內外品牌展示了最新的製冷空調、智慧樓宇、熱泵、儲能、空氣處理、壓縮機、自控系統、應對氣候變化以及其他產品技術，一些突破性創新技術實現落地轉化。展會三天吸引了來自全球各地的近萬名專業觀眾和買家觀展洽談，與眾多展商達成了採購意向，海外觀眾佔比近15%。展會淨面積和觀眾數量，均創在北京舉辦的中國製冷展新高。

本屆展會為推動展商產品研發和技術創新，共評選出54項創新產品。另外，在本屆有首次亮相的產學融合路演示範專區，設置“科技成果轉化優秀案例”和“技術路演”兩大板塊，搭建交流平台，助力校企合作。並繼續舉辦“臭氧氣候技術路演”和“工業圓桌會議”，去促進行業各界進一步攜手做好製冷劑綠色替代，有效推動製冷空調行業的綠色低碳發展，應對全球氣候變化保護地球家園做出更多的貢獻。本屆還有熱泵專區，有“熱泵產品展示區”和“工業熱泵專用案例區”兩大板塊，並以“工業熱泵技術及市場推廣應用發展論壇”為主題，圍繞工業熱泵新技術、工業應用市場推廣開展交流討論。

本年度製冷展繼續加大專業觀眾組織力度，邀請不同領域專業團體組織參展參觀，所以香港空調及冷凍商會受到邀請後，聯同英國屋宇裝備工程師學會-香港分會（CIBSE-HKB）和香港能源工程師學會（HKAEE）組織了一個接近三十人的“中國製冷展交流訪問團”，出席了這個盛會。



4月7日，“中國製冷展交流訪問團”由三會會長和主席帶領下乘坐國際航班從香港出發去北京。晚上團隊出席了由上海唐博科技實業有限公司宴請的晚宴。行程第二天（4月8日）早上，各會主要代表出席了中國製冷展開幕典禮暨主題論壇。當會合了其他交流團成員在展會外拍攝團體照後，大家隨即到展覽會場拜訪來自香港的參展商，之後大家自由活動、各自參觀。到了大約下午六點，各會主要代表出席了中國製冷展的國際組織接待會和晚宴，國內外冷凍空調行業專家學者、海外及港台地區行業組織的代表、參展商代表及中國製冷展組委會的朋友藉此機會聚首一堂，場面非常熱鬧。

行程第三天（4月9日），交流團聯同香港註冊專門承建商（通風系統）協會，一起出發去離開北京兩小時車程的天津市，參觀由韓國LG在當地合資成立的樂金電子（天津）電器有限公司。LG的家用及商用空調小型機組在全世界都已經廣泛使用，但在香港還是起步不久，希望透過這次的參觀，能令到交流團對LG的空調產品能有更深刻的認識。在晚餐前，交流團還有機會在天津火車站前的海河和解放橋附近拍照留念，落霞與古建築物互相輝映，景色非常優美！LG特別在市內華夏未來公園的會所，安排了一頓豐富的晚宴來款待交流團，除了美食和源源不絕供應的白酒，大家特別對最後一款用數十種配菜自主混合而成的地道天津麵食留下深刻印象！

行程最後一天（4月10日）的上午，由菱和集團安排交流團參觀了北京中信大廈（常稱中國尊）的機電設施。北京中信大廈位於中國北京商務中心區，是一超高層摩天大樓，為中國中信集團總部大樓，佔地面積11,478平方米，總高528米，建築層數為地上108層、地下七層，建築外型設計靈感來自於中國古代盛酒器皿尊。目前為世界第10高樓（截於2022年），也是北京市最高建築及華北地區第三高建築。它們透過中央控制室和不同的節能設計，去提升整個大廈的能源效益。冷氣系統安裝了水冷離心式冷水機組和特別設計的室內式冷卻水塔，加上使用節能提升的軟件，使到大廈空調系統經常處於高效能狀態，交流團參觀後獲益良多。參觀完畢後，交流團出席由菱和招待馳名北京烤鴨午宴。之後，大家按計劃到北京首都機場乘坐航班回港，四天行程順利結束。

2024年三會合辦的中國製冷展交流訪問團能夠成功舉行，有賴各位同寅的大力支持，在此向大家表示衷心的感謝。明年中國製冷展會回到上海舉行，2025年我們在上海再見！





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## ACRA ACTIVITIES

### ACRA Annual Dinner 2024

On 27 November 2023, ACRA's Anniversary Dinner has been held at Crowne Plaza Hong Kong Kowloon East. We are glad to have invited the Director of Electrical & Mechanical Services, Mr. PANG Yiu Hung, Eric, JP as our Guest of Honour to participate and deliver a valued speech for supporting our air conditioning industry at this remarkable night. Over the years, ACRA has exerted the greatest effort in the development of the industry with distinguished accomplishments. With the leadership of our President – Ir M. T. LAW, council members and all stakeholders, ACRA will assuredly continue to enhance the air conditioning industry in the years ahead.



### E&M Expo 2024

Every single industry requires new blood for advancement. Representing the air conditioning trade, it is one of the main objectives for ACRA to invite youngsters to join the industry for their career development. On 26 January 2024, ACRA has participated in the E&M Expo 2024 by having our esteemed council members and youth committee members to share their professional experience and knowledge with the students for better understanding on the career path of the industry.



### Spring Dinner 2024

To celebrate the Chinese New Year of Dragon, ACRA's Spring Dinner 2024 was hosted at Hung Hom on 1 March 2024 that received overwhelming response from all members. Apart from enjoying the authentic cuisine, pleasant drinks, lucky draw and thrilling games, this event creates a relaxing environment for the participated members and industry professionals to connect with one another spontaneously. It is definitely one of the most unforgettable and successful events of ACRA of the year.



### Training in Handling HFC & Blended Type Refrigerants for ArchSD Contracts

ACRA is devoted to provide comprehensive training to all levels of industry practitioners to keep up with the skills and knowledge in order to cope with the latest market trend of refrigerants. On 13 March 2024, a half day revision course was organized for the renewal workers in handling HFC & Blended Type Refrigerants for ArchSD contracts at IVE Morrison Hill. The course has deliberated the current development of refrigerants and review of training materials in consideration with safety and environmental factors for the opportunity of work enhancement.



### Next Generation Refrigerants Development Class (16<sup>th</sup> Class)

The 16<sup>th</sup> class of the Next Generation Refrigerants Development hosted by ACRA, EMSD and VTC was held on 10 April 2024. 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

ACRA, EMSD, and Pro-Act by VTC have once again co-organized the Practical Training Course on Household Air-Conditioners using Mildly Flammable Refrigerant at VTC Pokfulam Training Centre Complex on 24 April 2024. Through this course, the participants were educated on the features, relevant OSH legislations, safe handling and technical requirements on different types of mildly flammable refrigerants as well as having the opportunity to safely execute appropriate installation, testing and report of the R32 refrigerant.

### ACRA Golf Day 2024 – BELIMO Cup

Sponsored by BELIMO Asia Pacific Ltd., the major sport event, ACRA Golf Day – BELIMO CUP was organized at the Palm Island Resort on 26 April 2024. Forty spectacular golfers from the air conditioning industry were attracted to participate in this golf tournament to compete for the championship while catching up with the professionals from the same trade in this occasion.



### ACRA Horse Racing Night 2024

The ACRA Horse Racing Night 2024 was held at Happy Valley Racecourse on 8 May 2024 which brought the respected members together with the attention on the electrifying Horse Racing Competition on top of savoring the delicacy. Congratulations to the lucky winners of the pleasurable evening.



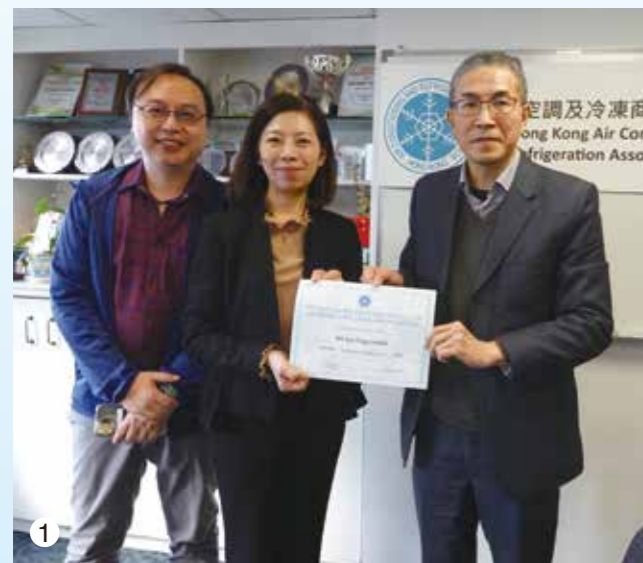
### S + Summit Cum Expo 2024

ACRA is committed to implement CSR by organizing various caring activities and contribute to the community as a whole on behalf of the air conditioning industry. On 9 May 2024, ACRA along with our caring members are pleased to attend the HKCSS S+ Summit Cum Expo at HKCEC.



## New Members

Membership		Member Name
1	Associate	Wo Kee Hong Limited
2	Associate	Everest Air-Conditioning Engineering Company Limited
3	Associate	Wise Corporate (Hong Kong) Limited
4	Associate	Ying Fung (HK) Engineering Limited
5	Associate	Bo Wah E & M Engineering Company Limited
6	Associate	D&B Engineering Limited



On behalf of the ACRA Youth Committee, it is our pleasure to share our works since our last newsletter.

## Technical Visits

### Thailand Technical Visit

Thanks to the arrangement by council members, youth members Rocky Fung (ATAL) and Ronald Kwong (Fook Loong) joined the trip in January 2024. During the trip, we visited different factories and learned more about the manufacturing process of different HVAC/R related products.



### DfMA Visit

This technical visit is arranged by O-Link Limited and for our youth members. With the supports of Kinger Chu (REC), this visit is held successfully. With the presentation by Ir Antonio Chan (REC), youth members learn more about the details in Automatic Welding, MiMEP and DfMA.



## Connections with HKFEMC and Other Organizations

As a member of HKFEMC, we participated in various events..



Construction Safety Week Carnival 2023



《工·書·教·學》 Presentation at school



EMSD Youth Members Event



Construction Safety Week Carnival 2023

Presentation by youth member, Alex Choi (JEC)

## Youth Member Connections

Besides regular meetings and events, we would like to organize more social events among youth members. Join us and achieve more together in the industry.



### Upcoming~

More joyful activities are to expect, indoor and outdoor activities, such as technical talk and sports activities. So, keep your eyes on us for more fascinating activities!



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Newland Engineering Limited	新陸工程有限公司	2967 8620	moshiu@newland.com.hk	Contracting
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Hsin Chong Aster Building Services Limited	新昌亞仕達屋宇設備有限公司	2675 3300	www.aster.hk.com	Contracting
Johnson Controls Hong Kong Limited	江森自控香港有限公司	2590 0012	www.johnsoncontrols.com	Contracting, Manufacturing, Servicing, Supplier
K-Thorn Engineering Company Limited	旗鋒工程有限公司	2481 2918	main@k-thorn.com.hk	Contracting
Lik Kai Engineering Company Limited	力佳工程有限公司	2611 4501	ericzung@likkai.com.hk	Contracting
Lucky Engineering Company Limited	運通冷氣電業有限公司	2780 5285	general@luckyeng.com.hk	Contracting
McQuay Air-Conditioning Limited	麥克維爾空調有限公司	2893 6261	www.mcquay.com.hk	Contracting, Manufacturing, Servicing, Supplier
MECO Engineering Limited	德寶工程有限公司	2774 8200	headoffice@meco.com.hk	Contracting
Midea Electric (Hong Kong) Limited	美的電器(香港)有限公司	3669 4888	www.mideahk.com	Contracting, Manufacturing, Servicing, Supplier
Quad-Tech Engineering (Hong Kong) Company Limited	高得工程有限公司	2573 1832	qt@quadtech.com.hk	Contracting
Raising Engineering Limited	威信工程有限公司	2395 6081	simonsiu@raising.com.hk	Contracting
Ryowo (Holding) Limited	菱和(集團)有限公司	2391 8381	www.ryowo.com	Manufacturing
Siemens Limited	西門子有限公司	2107 6506	andy.wong@siemens.com	Supplier
Skyforce Engineering Limited	天科工程有限公司	2885 1620	www.skyforce.com.hk	Contracting
Southa Technical Limited	南龍機電工程有限公司	2963 7175	www.southa.com	Supplier
Standard Refrigeration & Engineering Company Limited	立德工程有限公司	2781 0871	SRE@hklpg.com.hk	Contracting, Servicing, Supplier
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	Contracting, Servicing
Technicon Engineering Limited	得力確工程有限公司	3193 1300	technic@technicon.com.hk	Contracting
Welcome Air-Tech Limited	偉基空調有限公司	2806 8316	www.saiver-welaire.com.hk	Manufacturing, Servicing, Supplier
Westco Airconditioning Limited	威高冷氣工程有限公司	2426 3123	mandylo@scee.com.hk	Contracting



Company Name	Contact Number	Website / Email	Trade	
<b>ACRA Associate Members</b>				
ABB (Hong Kong) Limited	2929 3800	www.abb.com.cn	Supplier	
Aeroseal (HK) Limited	亞樂斯(香港)有限公司	2511 2118	www.aerosealhk.com	Contracting
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
Alfa Laval (China) Ltd.	瑞典阿法圖拉化伐(中國)有限公司	2589 3859	www.alfalaval.com	Manufacturing, Servicing, Supplier
Alpha Appliances Limited	第一電業有限公司	2529 7555	www.alpha-general.com	Supplier
Anway Engineering Company Limited	正佳工程有限公司	2598 4228	www.anway.com.hk	Supplier
Armaceil Asia Limited	阿樂斯亞洲有限公司	2574 8376	www.armaceil.com	Manufacturing
Arnhold & Co., Ltd.	安利有限公司	2807 9400	www.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
Associated HVAC Contracting Company Limited	華聯冷氣工程有限公司	2573 1716	aec@aechvachk.com	Contracting, Servicing
Auto Integrated Limited	奧力科技有限公司	2612 0758	rickie@autoinhk.com	Manufacturing, Servicing, Supplier
Belimo Asia Pacific Limited	博力謀亞太有限公司	2682 7837	www.belimo.com	Manufacturing
Biocline Healthcare Services Ltd.	新康醫療器材工程有限公司	2672 1111	bio@biocline.com	Contracting
Bitzer Refrigeration Asia Limited	比澤爾制冷亞洲區有限公司	2868 0206	www.bitzer.de	Supplier
Bo Wah E & M Engineering Company Limited	寶華機電工程有限公司	3709 2431	bowahws@gmail.com	Contracting, Manufacturing, Servicing, Supplier
Bolfilter Hong Kong Ltd.	波勒過濾系統(香港)有限公司	2715 5000	www.bolfilterchina.com	Manufacturing, Servicing, Supplier
Bonda Engineering Limited	百利達工程有限公司	2401 7880	enquiry@bondaengineeringltd.com	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
CDBM Engineering Consultant Company Limited	新雄力工程顧問有限公司	2598 1668	cedrick@cdbm.com.hk	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
Chin Tat Trading Company	展達貿易公司	3521 1589	www.chintat.com.hk	Supplier
China Overseas Mechanical & Electrical Engineering Limited	中國海外機電工程有限公司	2823 7821	http://www.cohl.com	Contracting, Servicing
Chit Tat Electrical Engineering Limited	捷達機電工程有限公司	2529 8888	www.chittat.com.hk	Contracting, Manufacturing, Servicing, Supplier
Chong Kin Air-Condition Engineering (Hong Kong) Company Limited	創建冷氣工程(香港)有限公司	2326 6100	www.chongkinaircon.com	Contracting, Servicing
C.J. Wishing International Limited	惠生電業有限公司	2799 9797	cjwish@cjwish.com.hk	Supplier
CLPe Solution Limited	中電源動有限公司	2678 7900	www.clpesolutions.com	Contracting, Servicing
Clydeman Engineering Limited	佳電工程有限公司	2332 3591	daniel@clydeman.com	Contracting, Servicing, Supplier
Crownint Limited	冠殿有限公司	8202 0830	clchoy@crowntingrp.com.hk	Contracting
CYH Limited	仲賢行有限公司	2967 3999	www.cyhld.com.hk	Supplier
D&B Engineering Limited	宏悅工程有限公司	2464 9768	dnbengineeringbo@gmail.com	Contracting
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
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, Servicing, Supplier
Electrodrive Engineering Limited	高宜工程設備有限公司	2573 7211	info@electrodrive-eng.com	Contracting, Servicing, Supplier
Enviro-Tech Engineering Company Limited	鷹達工程有限公司	2827 0688	stevelli@envirotech.com.hk	Contracting
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
Everest Air-Conditioning Engineering Company Limited	鼎峰冷氣工程有限公司	3460 4727	everest729.aircon@gmail.com	Contracting
Evergreen Environmental Technology Company Limited	冬青環保科技有限公司	2562 3331	www.evergreen-environmental.com	Contracting
Extensive Trading Company Limited	精基貿易有限公司	2889 1681	www.extensive.com.hk	Contracting
Far East Engineering 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 8399	www.gelec.com.hk	Supplier
Gether-Force Air-Conditioning Engineering Co., Ltd.	群力冷氣工程有限公司	2890 2622	admin@getherforce.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, Servicing, 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
GRUNDFOS Pumps (Hong Kong) Ltd.	高福水泵(香港)有限公司	3540 0300	www.grundfos.com	Manufacturing



Company Name	Contact Number	Website / Email	Trade
Haier International Co., Ltd.	2169 1206	www.haier.com	Contracting, Manufacturing, Servicing, Supplier
Hensen System Engineering Limited	2884 9001	info@hensen.com.hk	Contracting, Manufacturing, Servicing, Supplier
Hilti (HK) Limited	2954 1751	www.hilti.com.hk	Contracting, Manufacturing, Servicing, Supplier
Hofmann Construction Material Ltd.	3157 1841	www.hofmannhq.com	Contracting, Manufacturing, Servicing, Supplier
Honest Air Conditioning Limited	2396 8108	www.achonest.com	Contracting, Manufacturing, Servicing, Supplier
Hong Kong Wai Mung Technology Limited	6801 7362	catherine@waimungtech.com	Contracting, Manufacturing, Servicing, Supplier
H.W. International Air Conditioning Limited	2796 8888	info@hooair.com	Contracting, Manufacturing, Servicing, Supplier
IES Engineering (Hong Kong) Limited	2992 0830	www.ieshk.com.hk	Contracting, Manufacturing, Servicing, Supplier
InnoTec Engineering Ltd.	3706 6333	info@innoteceng.com	Contracting, Manufacturing, Servicing, Supplier
Integral E&M Contracting Limited	2272 3690	www.buildking.hk	Contracting, Manufacturing, Servicing, Supplier
Intelligent Technologies Limited	2301 4868	info@intelligent-net.com	Contracting, Manufacturing, Servicing, Supplier
JC (HK) Engineering Limited	2898 9885	jc.hk.eng@gmail.com	Contracting, Manufacturing, Servicing, Supplier
Jetford Engineering & Trading Company Ltd.	3101 2323	www.jetford.com.hk	Contracting, Manufacturing, Servicing, Supplier
J & J Network Engineering Company Limited	3579 5263	www.jjnetwork.com.hk	Contracting, Manufacturing, Servicing, Supplier
Johnson Controls-Hitachi Air Conditioning Trading (Hong Kong) Limited	2590 0012	www.jci-hitachi.com	Contracting, Manufacturing, Servicing, Supplier
Joneson Environmental Technologies Limited	2889 8220	jet@fsenv.com.hk	Contracting, Manufacturing, Servicing, Supplier
Join Rich Engineering Limited	3153 2048	www.joinrich.com.hk	Contracting, Manufacturing, Servicing, Supplier
Jinchat Engineering (HK) Company Limited	2687 1755	jjin@jinchat.com	Contracting, Manufacturing, Servicing, Supplier
Jun Feng Company Limited	2707 3088	www.junfeng.com.hk	Contracting, Manufacturing, Servicing, Supplier
Kamui Cold Chain Engineering & Service Limited	2554 6666	admin@kamui.hk	Contracting, Manufacturing, Servicing, Supplier
Keio Engineering Company Limited	2695 8872	www.keio.com.hk	Contracting, Manufacturing, Servicing, Supplier
Kembla (Hong Kong) Limited	2528 0999	www.kembla.com.hk	Contracting, Manufacturing, Servicing, Supplier
Kin Wo A/C Engineering Limited	2398 0157	kw@kinwo.com.hk	Contracting, Manufacturing, Servicing, Supplier
Kinetics Noise Control (Asia) Limited	2191 2488	www.kineticsnoise.com	Contracting, Manufacturing, Servicing, Supplier
Kings View Airconditioning Engineering Co., Ltd	2796 2417	admin@kingsview.com.hk	Contracting, Manufacturing, Servicing, Supplier
Kitz Hong Kong Company Limited	2728 2199	www.kitz.co.jp	Contracting, Manufacturing, Servicing, Supplier
K-Flex (Hong Kong) Insulation Company Limited	2668 5202	www.k-flex.com	Contracting, Manufacturing, Servicing, Supplier
KSB Limited	2147 1226	www.ksb.com	Contracting, Manufacturing, Servicing, Supplier
K.Y.H. Steel Company Limited	3473 2332	www.kyh.com.hk	Contracting, Manufacturing, Servicing, Supplier
Laser Resources (Asia) Company Limited	2516 7500	laasiahh@netvigator.com	Contracting, Manufacturing, Servicing, Supplier
Lap Kei Engineering Company Limited	2798 8210	www.lapkeieng.com	Contracting, Manufacturing, Servicing, Supplier
LeBlanc Water Treatment & Chemicals Limited	2408 2000	www.leblanc.com.hk	Contracting, Manufacturing, Servicing, Supplier
Lee Tack Engineering Company Limited	2305 3111	ltec@leetack.com.hk	Contracting, Manufacturing, Servicing, Supplier
Lee Yip Metal Products Company Limited	3651 2698	www.leekeegroup.com	Contracting, Manufacturing, Servicing, Supplier
Legend Engineering Company Limited	2815 0928	info@legendjt.com.hk	Contracting, Manufacturing, Servicing, Supplier
Lifa Air Limited	2511 7076	www.lifa-air.com	Contracting, Manufacturing, Servicing, Supplier
Link The Best Company Limited	2568 4092	www.linkthebest.com.hk	Contracting, Manufacturing, Servicing, Supplier
Luen Fat Air Condition (Holding) Trading & Engineering Co., Ltd.	2345 0280	www.luenfat.com	Contracting, Manufacturing, Servicing, Supplier
Luen Ming E & M Engineering Ltd.	3619 9186	info@luenmingem.hk	Contracting, Manufacturing, Servicing, Supplier
Luen Ming Pengshan Air Conditioning Factory Ltd.	2797 2168	www.luenming.com	Contracting, Manufacturing, Servicing, Supplier
Man Tung Air-Conditioning E & M Ltd.	3165 8698	www.manshugroup.com.hk	Contracting, Manufacturing, Servicing, Supplier
Mason Industries (HK) Limited	2967 9639	www.mason-hk.com	Contracting, Manufacturing, Servicing, Supplier
Maxwell Electrical Asia Ltd.	3583 5088	www.maxwell-asia.com	Contracting, Manufacturing, Servicing, Supplier
Mesan Fiberglass Engineering (International) Limited	2787 5717	www.mesanct.com	Contracting, Manufacturing, Servicing, Supplier
Mitsubishi Electric (Hong Kong) Limited	2887 4572	www.mitsubishielectric.com.hk	Contracting, Manufacturing, Servicing, Supplier
NAP Acoustics (Far East) Limited	2866 2886	www.napacoustics.com.hk	Contracting, Manufacturing, Servicing, Supplier
Nanofil Filtration Technology Limited	3708 1838	www.nanofil.com.hk	Contracting, Manufacturing, Servicing, Supplier
Nation Engineering Company	2728 2955	info@nec-hk.com	Contracting, Manufacturing, Servicing, Supplier
New Way Engineering Company Limited	2325 6892	www.newway.com.hk	Contracting, Manufacturing, Servicing, Supplier
O-Link Limited	2619 8888	www.o-link.com.hk	Contracting, Manufacturing, Servicing, Supplier
Oxprime (International) Limited	2590 8088	info@oxprime.com	Contracting, Manufacturing, Servicing, Supplier
Pacific Sense Enterprises Limited	3749 5272	www.pacificsense.com.hk	Contracting, Manufacturing, Servicing, Supplier
Paul Y. (E&M) Contractors Limited	2831 8338	www.pyengineering.com	Contracting, Manufacturing, Servicing, Supplier
Pekko Engineers Limited	3973 0698	www.leightonasia.com	Contracting, Manufacturing, Servicing, Supplier
PowerTech IPC Company Limited	3105 3928	www.powertechipc.com	Contracting, Manufacturing, Servicing, Supplier
Powers Technical Services Limited	2770 2110	sosaitung@gmail.com	Contracting, Manufacturing, Servicing, Supplier

ACRA Associate Members



Company Name	Contact Number	Website / Email	Trade
Practical Engineering (Hong Kong) Company Limited	2402 2772	practical@practical.hk	Contracting, Manufacturing, Servicing, Supplier
Pyrofoe Engineers Limited	2388 8038	www.pyrofoe.com.hk	Contracting, Manufacturing, Servicing, Supplier
Ready Electrical Metal Work Limited	2898 8623	kw_leung@ready-group.com	Contracting, Manufacturing, Servicing, Supplier
REC Green Technologies Company Limited	2619 8817	www.rec-gt.com	Contracting, Manufacturing, Servicing, Supplier
Ritech Engineering & Supply Company Limited	2410 1819	www.ritech-hk.com	Contracting, Manufacturing, Servicing, Supplier
San Yik Air Conditioning Engineering Company Limited	3565 5812	www.sanyikgroup.com	Contracting, Manufacturing, Servicing, Supplier
Sanby Trading Company Limited	2573 4219	www.sanby.com	Contracting, Manufacturing, Servicing, Supplier
Samsung Electronics H.K. Company Limited	2862 6300	www.samsung.com.hk	Contracting, Manufacturing, Servicing, Supplier
Satchison Engineering Limited	2357 9382	ray@satchison.com.hk	Contracting, Manufacturing, Servicing, Supplier
Shenling Environmental Systems (Hong Kong) Ltd.	2603 0002	www.shenling.com	Contracting, Manufacturing, Servicing, Supplier
Shun Hing E & M Engineering Limited	2387 2882	project@shunhingeng.com	Contracting, Manufacturing, Servicing, Supplier
Shun Hing Electric Service Centre Limited	2406 5333	www.shunhing-service.com	Contracting, Manufacturing, Servicing, Supplier
Shun Hing Electronic Trading Co. Ltd.	2733 3888	www.shunhinggroup.com	Contracting, Manufacturing, Servicing, Supplier
Shun Tung Engineering Company Limited	2633 6866	info@shun-tung.com	Contracting, Manufacturing, Servicing, Supplier
Sing Kin Limited	2333 1518	singkin@gmail.com	Contracting, Manufacturing, Servicing, Supplier
Smartech HVAC & Engineering Limited	2521 9768	info@smartech-hvac.com.hk	Contracting, Manufacturing, Servicing, Supplier
Southa Engineering Limited	2963 7241	www.southa.com	Contracting, Manufacturing, Servicing, Supplier
Stars (Hong Kong) A/C & R Company Limited	6116 7832	stanley_yuen@hstars.com.cn	Contracting, Manufacturing, Servicing, Supplier
Sun Chun (E & M) Engineering Limited	3613 0755	info@sunchuneng.com	Contracting, Manufacturing, Servicing, Supplier
Sun First International Limited	2807 7888	www.sunfirst.com.hk	Contracting, Manufacturing, Servicing, Supplier
Sun Yu Chau Engineering Company Limited	2345 9355	www.sycengg.com.hk	Contracting, Manufacturing, Servicing, Supplier
Sunny Fire Engineering Ltd.	2395 6766	sunnyfireengltd@gmail.com	Contracting, Manufacturing, Servicing, Supplier
Sun Ying Prefab Products Limited	2547 7877	www.sunying.com.hk	Contracting, Manufacturing, Servicing, Supplier
Superpower Pumping Engineering Company Limited	2745 3562	www.sppump.com	Contracting, Manufacturing, Servicing, Supplier
Sustainable Energy Limited	2332 3077	www.sustaine.com.hk	Contracting, Manufacturing, Servicing, Supplier
Tak Cheong Air-Con. Equipment Supply Co., Ltd.	2310 0011	www.tcaircon.hk	Contracting, Manufacturing, Servicing, Supplier
Target Energy Solutions Limited	2345 0298	www.targetensol.com	Contracting, Manufacturing, Servicing, Supplier
Teembase Development Limited	2554 6263	www.teembase.com	Contracting, Manufacturing, Servicing, Supplier
The Hong Kong & China Gas Company Limited	2963 3368	www.towngas.com	Contracting, Manufacturing, Servicing, Supplier
Tinwood Pacific Limited	6325 1197	www.sinro.com	Contracting, Manufacturing, Servicing, Supplier
Tom's Equipment Company Limited	2757 5539	tom@toms-equipment.com	Contracting, Manufacturing, Servicing, Supplier
TICA-SMARDT Hong Kong Limited	2772 8448	kenneth.lee@smardt.com	Contracting, Manufacturing, Servicing, Supplier
Tin Sing Chemical Engineers Ltd.	2619 8858	www.rec-tsc.com	Contracting, Manufacturing, Servicing, Supplier
TROX Hong Kong Limited	2861 2261	www.troxapo.com	Contracting, Manufacturing, Servicing, Supplier
Tung Shing Hardware Company Limited	2626 9983	www.tungshinghardware.com.hk	Contracting, Manufacturing, Servicing, Supplier
Union (Luen Hop) Refrigeration Co., Ltd.	2627 4600	info@unionhk.hk	Contracting, Manufacturing, Servicing, Supplier
United Controls (Hong Kong) Limited	2556 1001	www.ucl668.com	Contracting, Manufacturing, Servicing, Supplier
Victaulic Hong Kong Ltd.	6898 6823	www.victaulic.com	Contracting, Manufacturing, Servicing, Supplier
Victory Engineering Service Company Limited	2979 4068	pamela@ves.hk	Contracting, Manufacturing, Servicing, Supplier
Viewco Building Services & Engineering Co., Ltd.	2543 0610	engineering@viewco.com.hk	Contracting, Manufacturing, Servicing, Supplier
Wardson Engineering Limited	2329 8268	wsengltd@yahoo.com.hk	Contracting, Manufacturing, Servicing, Supplier
White Hippo Limited	2303 1318	www.kshop310.hk	Contracting, Manufacturing, Servicing, Supplier
Wilco Engineering Limited	2344 7725	info@wilcoenghk.com	Contracting, Manufacturing, Servicing, Supplier
Wing Shing Air-Flow Company Limited	2792 6331	accounting@wingshing-hvac.com	Contracting, Manufacturing, Servicing, Supplier
WinTech Century Company Limited	2760 4883	www.tanda.info	Contracting, Manufacturing, Servicing, Supplier
Wise Corporate (Hong Kong) Limited	3705 8947	ErnestL@wisecohk.com	Contracting, Manufacturing, Servicing, Supplier
Wo Lee Steel Company	2393 0131	www.wolee.com	Contracting, Manufacturing, Servicing, Supplier
Wo Kee Hong Limited	2514 4700	www.wokeehong.com.hk	Contracting, Manufacturing, Servicing, Supplier
Wolter Asia Limited	2456 0198	info@wolter.com.hk	Contracting, Manufacturing, Servicing, Supplier
Wysermann Company Limited	2614 2213	wysermann@wysermann.com.hk	Contracting, Manufacturing, Servicing, Supplier
Yin On Trading Limited	2572 7110	office@yinon.com.hk	Contracting, Manufacturing, Servicing, Supplier
Ying Fung (HK) Engineering Limited	2690 0121	skchung@yingfung.corp.com.hk	Contracting, Manufacturing, Servicing, Supplier
Yordland Engineering Limited	2362 2186	www.yordland.com	Contracting, Manufacturing, Servicing, Supplier
York Choi Industrial Limited	2795 8286	www.yorkchoi.com	Contracting, Manufacturing, Servicing, Supplier
Yuen Fong Air-Condition Products (HK) Limited	2880 5880	yuenfongaircondition@hotmail.com	Contracting, Manufacturing, Servicing, Supplier
Zenith International Enterprise Ltd.	2815 5852	www.ebara.com.hk	Contracting, Manufacturing, Servicing, Supplier

ACRA Associate Members



# Phenotherm<sup>®</sup> Class '0' RIGID Phenolic Foam Insulation PROFESSIONAL'S CHOICE for Ductwork & Pipework in HVAC/R System

VARIOUS colour vapour barrier surface,  
fit for VARIOUS design environment / purpose  
Aluminium Foil Facing Options :  
Aluminium bright / Black matt / White antiglare & etc...

Pipe & Duct Support Insulation  
- Load-Bearing Insulation  
- Fit for Various Insulation  
- Perfect the Whole Insulation System



## **PAL**<sup>®</sup> Complete Quality Accessories lead to a PERFECT INSULATION SYSTEM !



PAL<sup>®</sup> IA 911WB  
Class '0' Water Based  
Insulation Adhesive



PAL<sup>®</sup> IS 918WB  
Class '0' Water Based  
Industrial Sealant



PAL<sup>®</sup> IA 811WB  
Class '0' Water Based  
Insulation Adhesive



PAL<sup>®</sup> PP-11WB  
Water Based  
Protective Paint



PAL<sup>®</sup> AT-38 Series  
Class '0'  
Alum. Foil Tape



P-flex<sup>®</sup> Class '0'  
Foam Tape (Self-Adhesive)

# P-flex<sup>®</sup> Class '0'

Flexible Elastomeric Insulation

### Features & Characteristics

- ★ Flexible
- ★ Non-Fibrous
- ★ Good Resistance to Water & Vapour Permeability
- ★ Built-in Skin as Vapour Barrier
- ★ High Emissivity Surface

P-flex<sup>®</sup> Class '0' Faced Foam Sheet/Foam Tube with PAL<sup>®</sup> DSF818 Series  
Different colour suitable for various design environment  
Aluminium bright / Black matt / White antiglare & etc...



PAL<sup>®</sup> DSF818



PAL<sup>®</sup> DSF-Black 818



PAL<sup>®</sup> DSF-White 818



PAL<sup>®</sup> DSF-Black 818

PAL<sup>®</sup> DSF-White 818

Extra covering provide stronger surface protection!



Class '0'  
Foam Sheet



Class '0'  
Foam Tube

SOLE AGENT/STOCKIST :



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19/F, Skyline Tower, 18 Tong Mi Road, Kln., HONG KONG.  
Email : flhk@flhk.com.hk ☎ 2393-7773  
www.flhk.com.hk FAX : (852) 2390-6377