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## Message from the President



**Ir Antonio Chan**  
*President*

Thank you very much for your support and it is my great honour to serve as the President of the Association. I would like to express my sincere gratitude to the Immediate Past President Ir C F Wu for his leadership in the past two years with the support from the council who devote themselves in the daily operation of the Association. I would also like to express my heartfelt thanks to all Past Presidents, and those who have been working closely with the Association together upholding the common interest of the Air Conditioning and Refrigeration Industry.

Continuous with the effort from the Immediate Past President, the participation of the Youth Committee is getting more and more vibrant. With enormous commitment from all Youth Committee members, they will not be only contributing as the supporting roles, but they have agreed to participate, according to their field of experts, in all technical committees to share, contribute, learn and be inspired with all kind of technical knowledges. This is important not only to all Youth Committee Members, but also to all technical committee members as they have a new source of young talents supporting them serving the industry. I have to express my heartfelt thanks to all Youth Committee Members for their support and contribution.

Continuous professional development is considered as a very important process not only to members but also to the industry. Therefore ACRA will carry on offering various training classes and seminars for our members and industry stakeholders. Under the leadership of Mr. Albert Lo of Trane, the Training Committee has just completed a series of MVAC Seminars named Training Course on MVAC System and Product Updates in 4 consecutive Monday evenings starting from 8 October 2018 and were warmly welcomed by members. Thanks for the renounced speakers sharing their update knowledge with the industry via ACRA training classes.

ACRA will continue his role working closely with various government bureaus and departments on the common interest of the Air Conditioning and Refrigeration industry in standards, policy advice, legislation requirement, consultation, specification, building energy code, etc. and above all sustaining the quality standard of our industry serving the community of Hong Kong. This includes Architectural Services Department Liaison Group, Electrical and Mechanical Services Department AC Working Group, Next Generation Refrigerant Liaison Group, Building Energy Code Technical Taskforce, Fire Services Department Fire Services Statutory Advisory Group and Ventilation Installation Liaison Group, Construction Industry Council (CIC) BIM Working Group, Steering Committee for Consultancy Study on Improving the Environment Performance of HK Construction Industry.

Members' attention is drawn to the recent launched Construction Innovation and Technology Fund (CITF) by the HKSAR Government under the administration of CIC. Hong Kong's construction industry is facing the challenges of a shortage of labour and an aging workforce. This newly established CITF seeks to promote wider adoption of innovative construction methods and technology to enhance productivity, construction quality, site safety and environmental performance through automation, industrialisation and digitisation. It will also help drive the transformation of the local construction industry, thereby enhancing its capability to meet our continuous strong demand for construction services. Members are encouraged to study the detail to seek funding support in adaptation of Building Information Modelling (BIM), Advanced Construction Technology (ACT), Modular Integrated Construction (MiC) and Manpower Development.

Besides the above industrial issues, ACRA will continue to serve our members by offering various kinds of social activities in order to have a platform for our members to share joys and have better understanding with each other. We have successfully arranged the first Cocktail Reception on 5 October 2018 and was warmly welcomed by our members with more than 200 numbers of attendees with the support from EMSD Key Members as our Honourable Guests. There will be more to come and members are reminded to pay attention to our forthcoming flyers. I am looking forward to meeting you all in the forthcoming ACRA 57th Anniversary Dinner on 19 November 2018.

Taking this opportunity, I would like to express my gratitude to members and friends for their efforts and contributions.

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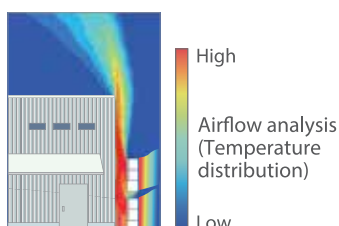
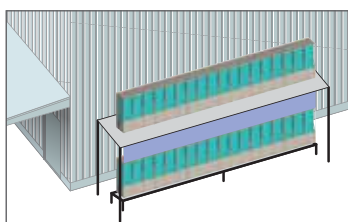
- High efficiency inverter compressor with COP 3.30 and ESEER 5.66.

## 2 Space Saving

- 2250 mm (w) x 900 mm (d) is occupied only.
- Cooling Tower not required.

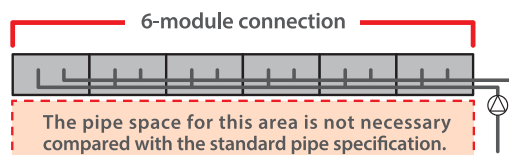
## 3 Flexible & Easy to Install

- 90kW module can connect up to 6 modules.
- Single-row double-stack can be installed flexibly.



- Inside header type is available.  
1 pair of pipes and 1 pump is required only.

• **Field water pipe header connection image**  
(In the case of installing one pump for one unit)





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# Treatment and Recycling of Refrigerators and Air Conditioners in Hong Kong

By: Nigel Mattravers and Vincent Cheng  
ALBA Integrated Waste Solutions (Hong Kong) Limited

## Introduction

At present, approximately 70,000 tonnes of waste electrical & electronic equipment (WEEE) is generated in Hong Kong every year. Hong Kong is one of the highest producers of e-waste in Asia. Without specific WEEE legislation, much of the generated material is believed to be exported to developing countries, where poor recovery methods are often adopted. The Hong Kong government determined that heavy reliance on exports is no longer sustainable in this sector of materials management because of tightening import controls over WEEE across the world. Moreover, WEEE contains harmful materials such as lead, mercury and refrigerant gases, which are hazardous to the environment and human health if not properly managed.

In response, the implementation of Producer Responsibility Scheme (PRS) by the Hong Kong government on 1st August 2018 and the opening of WEEE-PARK are important milestones for the development of self-sustaining model for managing Hong Kong's WEEE stream.

The treatment facility called WEEE-PARK, is built on a 3-hectare site in Eco Park, Tuen Mun and is the newest part of the advanced waste management infrastructure in Hong Kong. It will handle up to 30,000 tonnes of regulated e-waste, including refrigerators and air conditioners each year under normal conditions.

The main objective of the facility is to recover materials in a sustainable fashion by using different mechanical dismantling and separation technologies. State-of-the art technologies are used for the necessary detoxification, dismantling and recycling processes. Best practices have been adopted in order to prevent the leakage of hazardous chemicals, including refrigerants, throughout the process. At the moment, the WEEE.PARK is licensed to treat domestic use refrigerators, air conditioners, washing machines, televisions and computers (including monitors, printers and scanners). This article focuses on the treatment and recycling of refrigerators and air conditioners.

## Key Concerns for Refrigerators and Air Conditioners

There are two major challenges in the treatment and recycling of refrigerators. First, capturing and disposal of the refrigerants. Second, extraction of blowing agents from the insulation (polyurethane). For air conditioners, refrigerant extraction is the same as refrigerators but the quantity of refrigerant in an air conditioner is much more than a refrigerator.


## Refrigerant Extraction

In WEEE.PARK, the refrigerant extraction system is supplied and installed by a specialist Germany supplier. A suction plier (photo 1) is used to clamp on to the refrigerant circuit of the refrigerator or air conditioner. The tip of the plier punches through the copper pipe and extract the refrigerant and compressor oil mix to the extraction system. The mix is then heated up so that the refrigerant is separated from the compressor oil. The refrigerant is then cooled down and pumped into an FSD approved gas cylinder while the compressor oil is collected in an EPD approved chemical waste container.



*A Suction Plier Applied to the Refrigerant Circuit of a Refrigerator*



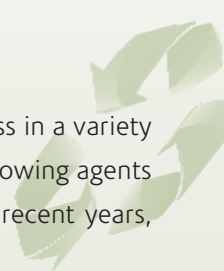


Under the Ozone Layer Protection (Controlled Refrigerants) Regulation, equipment which recovers or recycles controlled refrigerants must apply for a licence with EPD. The process of compressing refrigerants into gas cylinders is regarded as manufacture of dangerous goods and, therefore, under the Dangerous Goods Ordinance, a licence for the manufacture of dangerous goods is required from FSD.

The current refrigerants found in the refrigerators collected for treatment are mostly R12 (CFC) and R134a (HFCs) with a small quantity of R600a (LPG). R12 is ozone depleting substance (ODS) and the Global Warning Potential (GWP) Index of R134a is 1,300. For air conditioners, the common refrigerants found are R22 and R410a with GWP of 1,760 and 2,088 respectively. They are being sent to the Chemical Waste Treatment Centre in Tsing Yi for destruction. R600a is a common refrigerant in new refrigerators but currently it only occupies a small fraction of those refrigerators sent to WEEE.PARK for treatment. The small quantity does not justify meaningful reuse (e.g. driving LPG forklifts). It is currently being flared by a registered gas contractor.

### Blowing Agent Extraction

A blowing agent is a substance which is capable of producing a cellular structure via a foaming process in a variety of materials that undergo hardening or phase transition, such as polymers, plastics, and metals. The blowing agents commonly used for insulation foam (polyurethane or PUR) in refrigerators are R11 and R12. In the recent years, R601a (2-Methylbutane) is also common blowing agent in new refrigerators.



*The main shredding chamber, cyclone separator and zigzag separator*

In WEEE.PARK, the extraction of these chemicals from the PUR is fully automatic. A refrigerator, after extraction of refrigerant and removal of the compressor, is shredded into small pieces. Then different material separation techniques (photo 2) are used, including magnetic separator, eddy current separator, zigzag separator, cyclone separator, to separate different fractions of materials, i.e. ferrous metal, non-ferrous metal, plastics and PUR. The PUR pellets are brought to a de-gassing chamber (photo 3) by a stream of nitrogen. A steam boiler provides steam of about 2.5 bar at about 1200C to mix with the PUR inside the chamber. After about 30 to 40 minutes, the blowing agents will be released from the PUR and mixed with the steam. The raw gas first passes through a set of active carbon filters which will absorb steam, R11 and R601a. R12 will go through the filters and be cooled down before compressed into a gas cylinder.



*The Two Degassing Chambers*

The raw gas absorbed by the active carbon filters will be released at pre-determined time interval and the gas coming out will be cooled down in a controlled manner. When the raw gas is cooled to below 1000C, water is collected and returned to the system for reuse. When the temperature reaches about 27oC, R601a will be obtained. Finally,



when the temperature goes below 23oC, R12 will be come out. This reversed distillation process is called "Rectification" (Photo 4).

## Handling of Refrigerants and Safety Measures

The treatment process of refrigerators and air conditioners are carried out in batches according to refrigerant types so that there is no mixing of refrigerants. The gas cylinders holding different types of refrigerants are kept at DG stores until they are collected by the Chemical Waste Treatment Centre for final disposal.



*Activated Carbon System for Separation of Blowing Agents*

To prevent any fire or explosion during the shredding process in case there is residual flammable refrigerants left in the refrigerators, the shredding chambers and material transfer ducts are inertised by nitrogen. Fire detectors are also built into the treatment line. If fire is detected, the dry-powder fire extinguishers will be triggered to kill the fire.

In the refrigerant extraction areas, flammable gas detectors are installed to detect leakage of flammable refrigerants according to the guidelines of EMSD.

## Benefits

For refrigerators, the US EPA RAD Programme\* shows that proper treatment of one refrigerator will:

avoid refrigerant emission	2.240 TCO2e
avoid foam emission	2.070 TCO2e
save emission through recycle plastics	0.014 TCO2e
save emission through recycle metal	0.145 TCO2e

\* <https://www.epa.gov/rad/program-benefits>

For air conditioners, a rough estimate for a 2-HP split-type air conditioner of 40kg weight containing 800g of R410a (GWP 2,088):

avoid refrigerant emission	1.670 TCO2e
provide recycled metal	32 kg
provide recycled plastic	3.2 kg of plastic.

## About ALBA IWS

ALBA Integrated Waste Solutions (Hong Kong) Ltd is a joint venture company which was established by German recycling specialist ALBA Group and the local waste management company Integrated Waste Solutions Holding Ltd.

In 2015, ALBA IWS entered into a contract with the Hong Kong government to design and build a Waste Electrical and Electronic Equipment Treatment and Recycling Facility, provide collection services and operate the facility on behalf of the government until 2027.

With a combination of German advanced technology and local operational experience, ALBA IWS is dedicated to providing a sophisticated E-waste management service for individuals and organisations.

Info. Box

WEEE-PARK Visit Booking: [visit@weee.com.hk](mailto:visit@weee.com.hk)

Website: [www.weee.com.hk](http://www.weee.com.hk)

WEEE Collection Hotline: 2676 8888

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# Proper Recycling of Regulated Electrical Equipment Turning Waste into Resources



As a supplier and / or seller of Regulated Electrical Equipment (REE), what is the role and responsibility of ACRA members in the Producer Responsibility Scheme (PRS) before collection?

1. "Supplier" includes general importers, authorised dealers and parallel importers, but does not include persons who are only engaged in re-export business, logistics service providers or persons who only display REE and are not involved in the distribution of the equipment. A supplier of REE must have been registered with the Environmental Protection Department (EPD) before distributing REE. Registered suppliers must also fulfil other statutory obligations, including the submission of returns to the EPD and payment of recycling levies, as well as providing recycling labels when distributing REE;
2. "Seller" means a person who carries on a business of distributing regulated electrical equipment (REE) to consumers. Contract Scope includes **"Supply and Installation"** of air conditioners as defined in REE, the contractor falls into the definition of "Seller". A seller must have a removal service plan endorsed by the EPD for selling REE. When a seller sells REE and if requested by the consumer, the seller should arrange for the consumer a free removal service to dispose of the same class of equipment abandoned by the consumer in accordance with the endorsed plan. The seller must also provide recycling labels to consumers purchasing REE, and a receipt containing the prescribed wording on the recycling levies.
3. The REE shall be collected by a "Collector" in the Supplier's removal plan and delivered to a "Recycler" who must hold a waste disposal licence under the Waste Disposal Ordinance (Cap. 354) that authorises to treat, reprocess or recycle abandoned REE (e-waste). ALBA Integrated Waste Solutions (Hong Kong) Limited is only one licensed recycler to cover treatment, reprocessing or recycling of Air conditioner and Refrigerator.
4. All REE shall be disconnected from electrical power and placed for easily collection before collection e.g. not on supporting frame at outdoor etc.. Refrigerant inside the split type air conditioners shall be removed to properly designed refillable containers using an EPD approved recovery unit. Different refrigerant gases should not be mixed in the same container. If the refrigerants used are CFC or HCFC e.g. R11, R22 etc., the contaminated refrigerants shall be collected by a licensed waste collectors and disposed at a licensed facility in accordance to Waste Disposal (Chemical Waste) (General) Regulation.

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**Questions?** Contact Ivan Lee: email [ivanlee@dpx.hk](mailto:ivanlee@dpx.hk) | call 852-2511-2118.

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## 联明LM® - TDC



### FEATURE

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### MANUFACTURING COSTS COMPARE WITH SLIP ON FLANGE DUCT (Size:1000mm×1200mm×1500mm)

#### 联明LM® - TDC

	Number of Men	Time	Total Time
Roll Form Seam	1	1 min.	1 min.
Roll Form TDC	1	1 min.	1 min.
Form in TDC Wrap Brake	1	1 min.	1 min.
Whisper-loc Seam	1	1 min.	1 min.
Cornermatic Corner Installation	1	1 min.	1 min.
Apply Sealant to Corners	1	1 min.	1 min.

**TOTAL ESTIMATED TIME REQUIRED 6 MINUTES**

#### SLIP ON FLANGE

	Number of Men	Time	Total Time
Roll Form Seam	2	2 min.	4 min.
Get Flange from Stock	1	1 min.	1 min.
Saw Flange to Length (8 pieces)	1	3 min.	3 min.
De-burr	1	2 min.	2 min.
Assemble Frames(2)	1	5 min.	5 min.
Install Flange to Duct	1	8 min.	8 min.
Apply Sealant Flange Perimeter	1	6 min.	6 min.
Apply Sealant to Corners	1	1 min.	1 min.

**TOTAL ESTIMATED TIME REQUIRED 30 MINUTES**

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### FEATURE

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## People Interview

### with Mr. Kelvin Tam

譚嘉華先生(Kelvin Tam)作為工程業界為人熟悉之翹楚，本會很榮幸邀請到譚先生撥冗應邀接受訪問，與大家分享他的項目管理理念和人生體驗。言談間譚先生能言善道而不失幽默，在歡快的氛圍中闡釋可貴觀點，使訪問內容豐富，本會受益匪淺。



譚嘉華先生

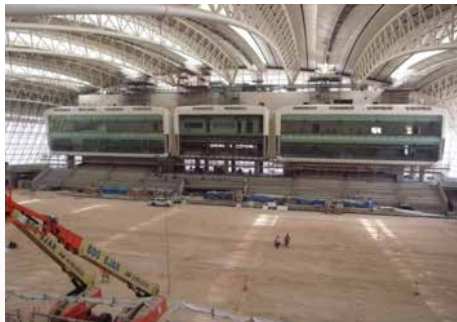
#### 一句座右銘，受益一生

在香港出生的譚先生七歲離家回鄉，到廣州和姐姐在寄宿學校生活了兩年，當時因年幼而成為被欺凌的對象，縱然面對逆境，卻鍛練出譚先生堅毅不言敗的性格，成就其日後就學及事業的成功之路。在當年小學畢業時，良師寄予「沉而鎮之以靜，剛而鍊之以潛」之座右銘，使譚先生時刻警醒為人處事要沉著冷靜，切忌鋒芒太露。啟蒙益語，言簡意賅，讓譚先生畢生受用。譚先生以名列前茅的成績完成中學課程後便入讀香港工業專門學院（工專），惜其後因環境所致而輟學，輾轉間先加入父親所經營的化工集團工程部，參與電解車間，冷凍廠房等等發展項目的機電工程工作，繼而進入九龍中華電力有限公司工作。譚先生日間工作，夜間孜孜不倦在香港工專進修夜校，每年均考取第一名，最後並僅以少於兩年的時間，獲發一等榮譽學士畢業於英國的登地大學。回港後，再於機電界進一步積極開展事業。

#### 工程涉獵領域廣闊 行業視野閱歷豐富

譚先生屹立於香港機電界超過四十五年，曾就職於多間具規模集團及跨國企業，擔當要職並出任高級行政工作。一九八零年至一九八二年期間，譚先生於中華電力有限公司（中電）任職西區區域用戶工程師，專責審核三分之一九龍區及新界區所有範圍內之供電項目，包括批核供電系統圖紙、指導電氣裝置有關的疑難。然而，務求不斷進步和為拓展對不同範疇的認知，譚先生毅然投身機電顧問行列，加入科聯顧問工程師公司擔任聯夥人，所負責項目多不勝數，並在1980年便開始參與國內建築項目的設計，參與多項大型工程項目，為日後事業發展打下良好基礎。隨著顧問工作日子愈久，工作變得駕輕就熟、應付自如。為求再次突破和對工程施工有更深入的了解，就先後加入菱電工程/永興工程公司任高級經理，直接負責空調和電氣工程的投標和施工，以至執行安裝之工作概一手包辦，其中當然不乏行政和管理工作並協助團隊完成項目。其後被邀加入邁進機電工程顧問公司，擔任董事一職，約一年後就創立譚嘉華機電顧問有限公司，以董事總經理身份負責統領公司的日常營運、技術設計、編制招標文檔及管理工程項目。譚先生後來加入恒基兆業地產集團及美麗華酒店集團，同時兼任兩大上市集團的機電最高負責人工作達10多年，為香港及國內的很多大型項目作出設計及審核，涵蓋範圍包括設計、指導、施工和保





養工作。離開恒基，美麗華集團後，譚先生也曾擔任兩家跨國機電顧問公司的董事。他一生參與設計和施工的每一項目，均全部親力親為，工程包括國際金融中心 IFC，恒生中環和太子銀行，中國銀行，招商銀行，新的騰訊深圳總部，蘇寧南京總部，多個五星級酒店和不少超高層建築。除了累積豐富之個人閱歷外，亦為中港機電界貢獻良多。

### 難忘得獎項目 勇奪獲獎殊榮

出自譚先生手筆的項目眾多，而其中一個令譚先生畢生難忘的項目就是在中東多哈的【Al Shaqab 馬術中心】。此座馬術中心佔地約4萬5千平方米，項目在執行和工期控制上，由於地理及文化之差異，使項目的施工和管理面對重重挑戰。當譚先生接手項目時，由於設計的香港團隊並非長駐多哈，而兩地文化差異甚大，加上規範也絕不相同，引至陷於困境，一度由判商取了主導權，令到原設計施工寸步難行。譚先生埋頭苦幹，冥思苦索後結果從判商的施工圖之蛛絲馬跡中，找出問題的重點，作出相應之調整，而重整旗鼓，取回主動權。工程逐步得心應手，整個香港團隊鬥志昂揚，艱苦奮戰，卒之該項目以亮麗的面貌竣工。項目極具代表性，當時參加香港2012年優質建築比賽，結果脫穎而出，奪取了大獎中之最高金獎，為港增光。

### 敬業樂業 培養工作熱誠

譚先生行業經驗豐富，多年廣交同儕益友，建立珍貴感情，使在滿迎挑戰的工作中亦得到箇中樂趣。同時譚先生亦有所寄言，凡事均需用心盡力，必定有所回報。譚先生在十多年前，創立“香港陳式混元太極拳社”，擔任會長一職至今，有教無類，將太極拳推廣到機電工程界和社會。大家除了在機電工程上向譚先生請教之外，有空時還可以跟譚先生切磋交流太極拳的心得。編輯組在此感謝譚先生具啟發性又饒有趣味的分享，謹祝願譚先生生活充實美滿，享受精采人生。





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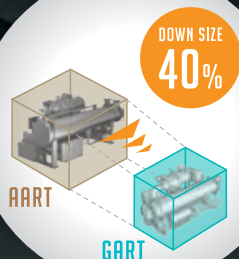
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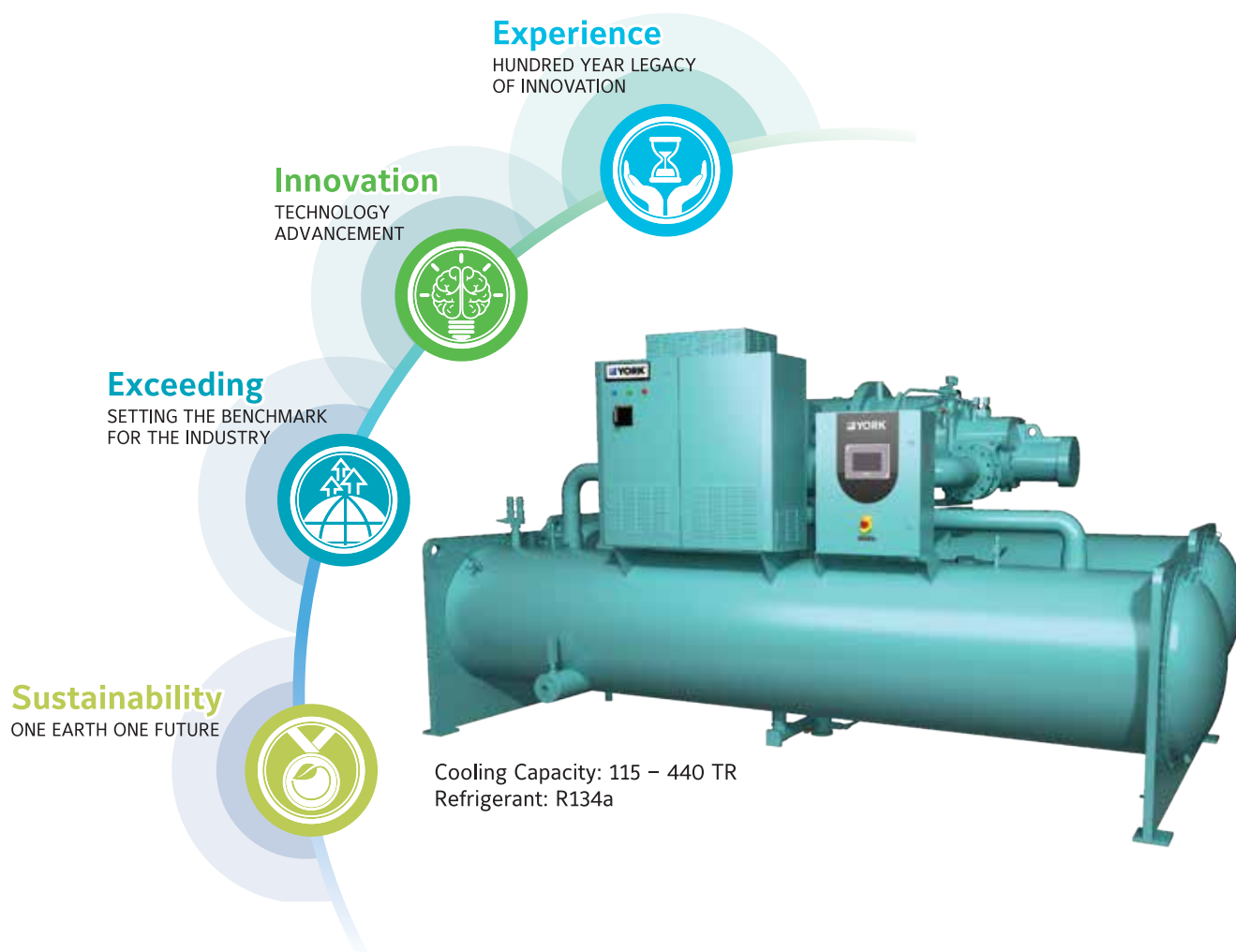
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- 5) 360° inverter motor cooling technology
- 6) A centrifugal chiller inlet guide vane correcting algorithm
- 7) Gas-inlet regulation mechanism and centrifugal compressor with this mechanism

## Recent Job References:

\*Photos are for reference only.



# 對違規淡水冷卻塔加強執法

政府於2000年6月推行一個非住宅樓宇水冷式空調系統廣泛使用淡水的計劃（淡水冷卻塔計劃）。該計劃是先導性計劃，先在本港6個選定地區接受申請，在該計劃廣泛被業界接受下，該計劃於2008年6月起由先行性質改為常設運作。

機電工程署於2006年7月推出一套指引包括冷卻塔設計、安裝、調試、操作及維修等的2006年版「水冷式空調系統實務守則」，以推廣適當地使用水冷式空調系統以達成能源效益，並同時兼顧環境和衛生等事宜。實務守則其後進行全面檢討，並改名為2016年版的「淡水冷卻塔實務守則」，新的實務守則包含第一部份的設計、安裝及調試；第二部份的操作及維修及第三部份的水處理方法。擁有人應保持淡水冷卻塔處於妥善的狀況，把對公眾構成的污染和滋擾減至最低。而在外地的案例中，沒有妥善管理的淡水冷卻塔被證實為退伍軍人病個案的感染源頭。為此，機電工程署按實務守則第二部制定了淡水冷卻塔操作及維修的良好作業指引，以供業界參考。

在這計劃下，淡水冷卻塔的供水必須來自水務設施並根據《水務設施規例》獲得水務監督書面許可。未有獲得許可的冷卻塔，會被視為「違規淡水冷卻塔」。根據機電工程署的統計，全港違規淡水冷卻塔的數目現時約有五千台，而於過去八年間，平均每年發現約五十台是新建的。

為確保市民的健康，水務署要求違規的營運者透過申請加入機電工程署的計劃，以符合當中對淡水冷卻塔的設計、安裝和運作及維修的相關要求，以獲得水務監督的許可而使用來自水務設施的供水作冷卻用途。而機電工程署定期對全港所有淡水冷卻塔作巡查及水質測試，根據《公眾衛生及市政條例》對不符合標準的水塔營運者發出《妨擾事故通知》，要求須按淡水冷卻塔實務守則進行緊急消毒及水質重新測試以確保水質不超出含菌量的要求。





為防止違規淡水冷卻塔的數目繼續增加，水務署及機電工程署對 已由2018年8月1日開始加強執法行動，對新建的違規淡水冷卻塔優先採取行動。新建的淡水冷卻塔包括：

- 於2018年8月1日或之後投入運作的新建淡水冷卻塔；及
- 翻新或重置於2018年8月1日之前已經投入運作的淡水冷卻塔。

另一方面，為確保現有的淡水冷卻塔有進行妥善管理及維修，機電工程署會繼續現行的水質狀況巡查。若巡查發現有的違規淡水冷卻塔欠妥善管理而水樣本持續不合格，政府會對該淡水冷卻塔優先採取執法行動。

政府會採取的執法行動包括：

- 根據《水務設施條例》及《水務設施規例》提出檢控；
- 根據《水務設施條例》發出《維修通知書》要求用戶移除未經批准伸延的內部水管；及
- 如未能遵從《維修通知書》的規定，將會停止對該用戶供水

政府建議現有違規淡水冷卻塔的營運者應盡快加入《淡水冷卻塔計劃》或盡早計劃更換為其他合適的空調系統。切勿安裝新的或重置現有違規淡水冷卻塔，否則會被檢控。營運者更應對現有淡水冷卻塔進行妥善的操作及維修。



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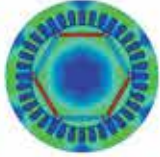
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