

# newsTRAC

NEWSLETTER FOR TECHNICIANS IN REFRIGERATION AND AIRCONDITIONING (RAC) SECTOR

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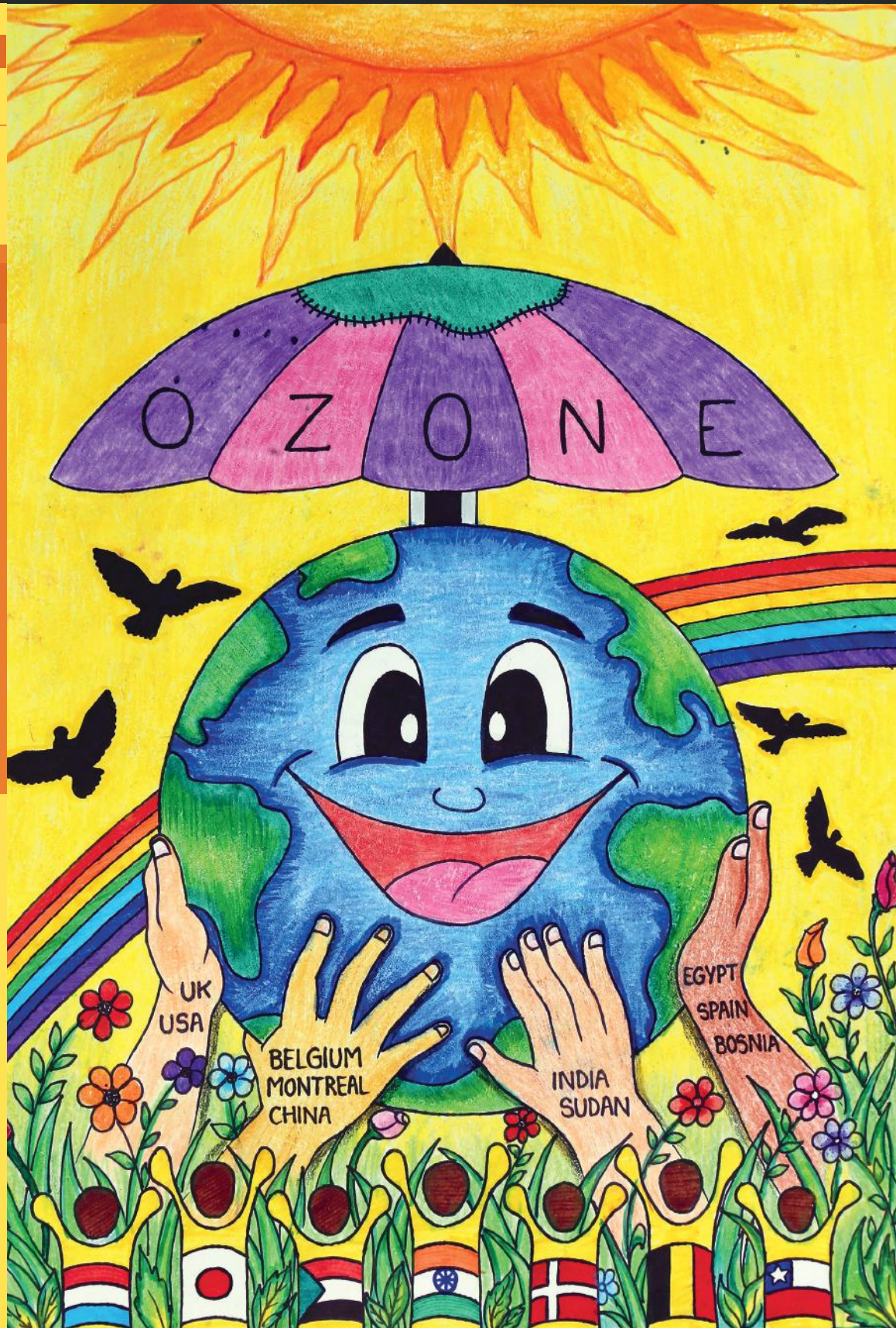
Ministry of Environment,  
Forest & Climate Change  
Government of India



United Nations  
Environment Programme



The Energy and Resources Institute



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## Foreword



Recently, India was the global host for the World Environment Day 2018 event from June 1 – 5, 2018. The day was celebrated with efforts by government, civic, and corporate bodies from across the country to bring more awareness to the theme of 'Beat Plastic Pollution'. At the time of celebrating India's achievements in environmental protection, it was also a good opportunity to reflect on environmentalism within the context of the Sustainable Development Goals, in which India played an important role in shaping.

The Montreal Protocol on Substance that Deplete the Ozone Layer has completed 30 years and has been rightly hailed as one of the most successful environmental treaties. The Montreal Protocol is also important in achieving targets under the Sustainable Development Goals, specifically, Goal 8 to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

In the course of implementing the HCFC Phase-out Management Plan (HPMP), it was recognized early on that training service technicians in good service practices would not only reduce HCFC consumption but would also provide better employment opportunities for technicians. As a result, till date 12,000 technicians have been trained under Stage I and 17,000 technicians will be trained under Stage II, beginning later this year.

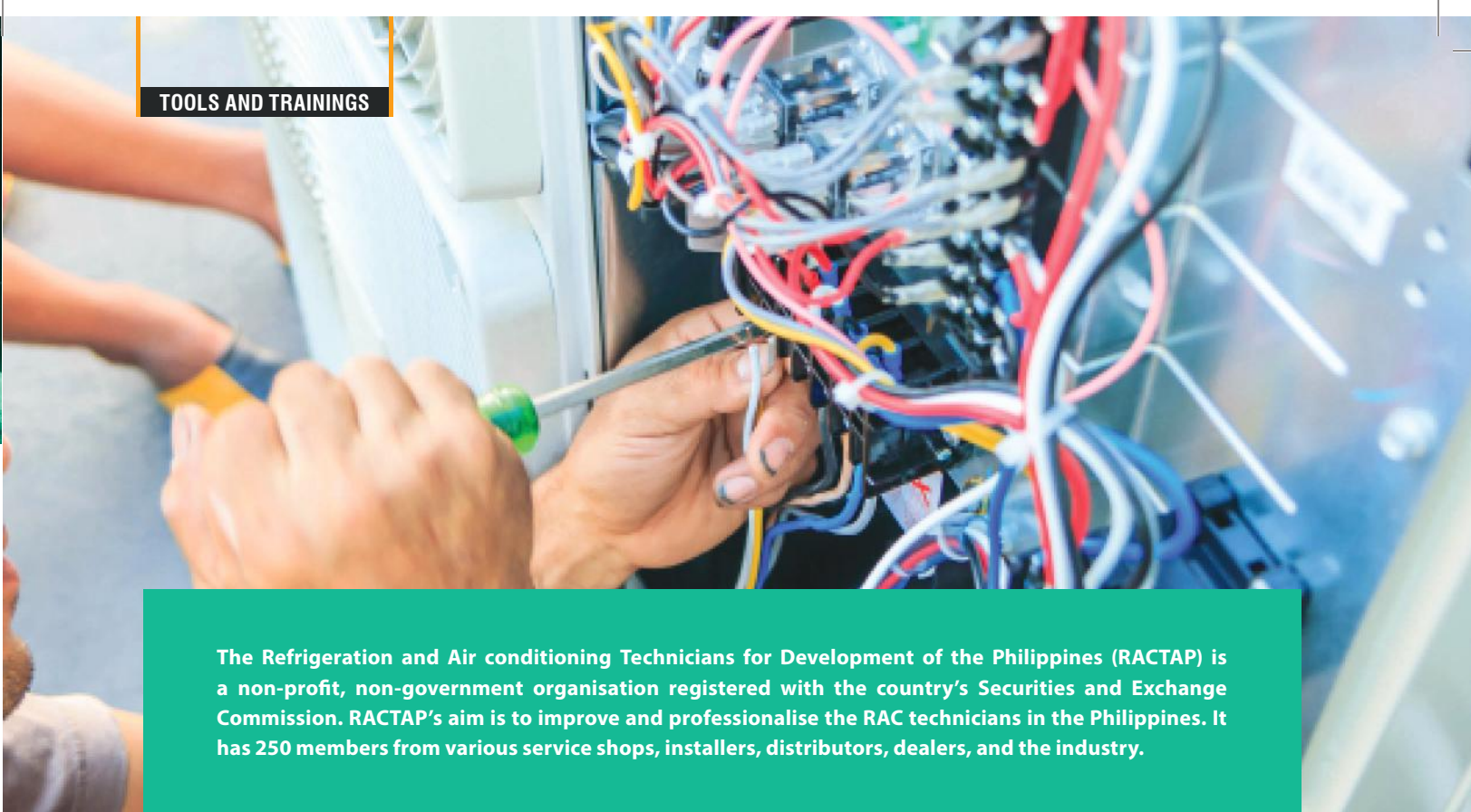
However, much remains to be done. With well over 200,000 technicians in the country and most of them in the informal sector, reaching out to technicians and providing them with training and knowledge in good service practices will be one of the most crucial steps in achieving the Montreal Protocol objectives in India. Technician safety and health are also important to achieve sustainable and inclusive growth in the air-conditioner market.

I hope that the latest edition of the newsletter will not only highlight challenges of the RAC servicing sector but will bring greater awareness on safe and environmentally sound servicing practices to technicians, who are important stakeholders in the Montreal Protocol process.

I thank UN Environment, the cooperating agency under HPMP for its support and The Energy and Resources Institute (TERI), the implementing partner for their tireless efforts in bringing out the newsletter.

My best wishes to all NewsTRAC readers.

Gyanesh Bharti  
Joint Secretary  
Ministry of Environment, Forest and Climate Change



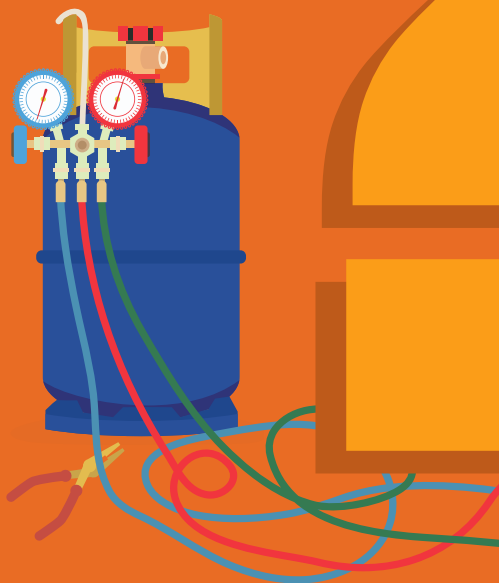
The Refrigeration and Air conditioning Technicians for Development of the Philippines (RACTAP) is a non-profit, non-government organisation registered with the country's Securities and Exchange Commission. RACTAP's aim is to improve and professionalise the RAC technicians in the Philippines. It has 250 members from various service shops, installers, distributors, dealers, and the industry.

In an emailed interview, Manuel Azucena, Consultant, RACTAP shared the good practices, challenges and the way forward for RACTAP. Edited excerpts below:

**?** Could you please tell us what are the major challenges facing the RAC servicing sector in the Philippines?

**Ans:** Globally, the challenges facing the RAC sector are the same. These mainly constitute:

- a) New refrigerants which are either flammable or high pressure: Most of the refrigerants that we deal with include R22, R134a, R410A, R600a and the recent R32 and R290. Technicians treat these new refrigerants in the same manner as R22 or R134a. Although, many technicians have been trained and are familiar with R410a, they still treat R32 as R410a focussing less on flammability. There have been instances where a technician serviced an R660a fridge and treated it as R134a disregarding the flammable impact. As a result, the technician got burned due to lack of knowledge on the new refrigerants. Also, some technicians use copper tubes which are not intended for high pressure refrigerants.
- b) The hurry to finish an installation or servicing causes lapse in following good practices. Some of the example are:
  - Recovery machine is not used and the refrigerants are released in the atmosphere
  - Not using a nitrogen regulator or not using nitrogen at all during servicing. Hence, the refrigerant is used for flushing or leak testing
  - Lack of other proper tools for servicing
- c) Lack of information about the environmental policy involving RAC technology





### ? What steps are being taken to address these challenges?

**Ans.** RACTAP conducts seminars on good practices four times a year. We teach the simple method of making a basic recovery machine. Other topics such as controls, VRV (variable refrigerant volume), inverter technologies are also discussed at the seminars/forum.

- a) The Department of Trade and Industry (DTI) requires all service shops and registered practitioners to have a recovery machine and basic servicing tools prior to their accreditation. RACTAP was recently roped in by DTI to share our experience with other trade (electronics, electrical, automotive) in the development of code of practice for RAC.
- b) The Technical Education and Skills Development Authority (TESDA) recognises our association as an industry partner. We are deeply involved in the development of our country's training regulation, assessment, and certification. Our aim is that all RAC technicians must be nationally certified.
- c) The national ozone unit regularly joins our seminar and shares the information on developments in the Montreal protocol issues

### ? What has been the impact of these steps? How do you measure the impact?

**Ans.** Although, we cannot monitor the activities of our members, we always remind them to adhere to the code of good practice. The important thing for us is to inculcate good practices in our members. So far, 80% of our members are nationally certified by TESDA. A technician is certified when she/he has passed the competency standards test set by TESDA and the industry.

### ? What activities have been envisaged to further improve the sector? What is the way forward?

**Ans:** We aim to conduct regular seminars for our members and encourage the industry to present their latest products so that our members stay updated. We continue to strengthen our linkages with the industry and different government agencies to be updated with the latest RAC innovations, policies, regulation relative to RAC servicing.

### ? Do you think these steps could be replicated in the Indian RAC sector? Could you please share any suggestions/ recommendations?

**Ans:** Yes, these steps can easily be replicated. My suggestion would be to keep the number of members limited for better training, management, and monitoring. We are screening potential bonafide members of our association. Non-members pay a minimum fee whenever we conduct a seminar, but members can attend any seminars or activities without any cost. The officers in our association work voluntarily free of cost. It is our commitment to improve the service technicians' approach. We prefer to grow slowly and gradually.



# THE EVOLVING RAC SECTOR DEMANDS TECHNICIANS TO STAY UP TO DATE

By Mathew C J

Refrigeration and air conditioning (RAC) have become a necessity across sectors, be it residential, commercial or industrial. RAC offers multiple solutions across various fields ranging from agriculture to automation and household appliances to industrial equipment. These sectors have high demand for skilled professionals to install, maintain and upgrade RAC equipment.

Till a few years ago, an RAC technician was required to handle only two refrigerants namely CFC-12 and HCFC-22. S/he required only a small box of tools and a refrigerant cylinder to do the job. However, the situation is quite different today. Rapid changes in technology and a growing concern for the environment have led to the development of alternative refrigerants that are eco-friendly but require safer work practices.

The RAC sector now demands knowledge of various disciplines such as mechanical, electrical, and electronic with a background in working with computerised, automated electronic heating, ventilation, and air conditioning (HVAC) equipment. Earlier, technicians relied on their experience to repair equipment as HVAC systems were simple but now it is crucial that they understand the nitty-gritties to gauge the root cause of the issue. With the introduction of new refrigerants and change in technologies, it is important for the technicians to keep themselves updated and acquire continual hands-on learning.

## CONSTRAINTS TO CONTINUOUS LEARNING

RAC technicians from the unorganised sector have limited resources to get information regarding change in technologies, good service practices and changing regulatory requirements. The objective of the two-day training program organised under HCFC Phase-out Management Plan (HPMP) is to facilitate learning about “why and how” of following good service practices (GSP). The focus is to provide hands-on training to the technicians so that they get updated on the changes in technology and improve their working methods by following GSP.

Most technicians in the unorganised sector get trained on the job. Due to high demand, these technicians get back-to-back service calls which makes enrolling them for the training sessions a challenge. The root cause lies in the fact that they initially do not recognise the need for any training as they are already experienced in the field. It is only when they attend the training session that they realise the practices that they were following were wrong and causing harm to the environment.

## NEED FOR TRAINING

These GSPs, if carried out correctly, have great potential to reduce repeated failures, ensure good performance and maintain energy efficiency of the equipment. These factors would cumulatively contribute to improved customer satisfaction and ultimately increase business.



Although, two days is too short a duration for dissemination of both theoretical and practical knowledge, it is not feasible for the technicians to take more time off their work as it will affect their business and livelihood. Taking this into consideration, the curriculum of the training program was prepared. Only the practices that are considered most essential are covered in the training. Most of the programs are scheduled on weekends. Though theoretical part of the training is important to make the participants understand the “know why” of the methods to be followed, it is not possible to transfer all the knowledge that is required within this short duration. Adults tend to learn quicker and gain deeper understanding of the subject through hands-on experience imparted in the practical sessions rather than observation and listening in the theoretical sessions. Hence, more weightage is given to the practical sessions.



## IMPACT OF TRAINING

The sessions that we have conducted till date have helped the past participants understand the need for improvement in their daily work practices. We have seen a growing trend in the use of vacuum pumps in this industry which is a good practice both in terms of work efficiency and quality. This being said, it is important that the participants maintain this momentum and continually ensure that their skills remain up to date.

Many of the alternative refrigerants are flammable and have higher pressure. Technicians need to be aware of the safety measures to be followed while handling these refrigerants. Some of the alternatives are zeotropic blends (mixtures that do not act as single fluid) and require different charging procedures. Leakages can be problematic with these refrigerants and are a constant hurdle that technicians face in the field. The curriculum of the training includes this topic enabling the participants to overcome this hurdle.

With the introduction of inverter and Variable Refrigerant Flow (VRF) technologies, technicians are now required to culminate the ability to look at the entire system to identify a problem. Untrained service technicians often fail to recognise the issue present in the system and tend to blindly charge incorrect quantity of refrigerant or even worsen existing problems by adding refrigerant to a system that is already full.

## THE WAY AHEAD

The need of the hour is to develop a localised platform for the technicians, where they can share their ideas and get information about the changes in technology. Platforms like Facebook and WhatsApp can be used to create local groups to build rapport, share information, ideas and get support when a need arises. This could leverage the strengths of a whole team of technicians.

As a group they should approach companies to organise house-sponsored events as part of their Corporate Social Responsibility (CSR) initiatives. Knowledgeable and enthusiastic technicians can lead these forums to share their experiences, brainstorm on improvements, and discuss new advances in the field.

There is an urgent need to create customer awareness on various aspects such as eco-friendly refrigerants, importance of energy efficiency, timely maintenance procedures among others. Also, in an industry where customers demand better service, technicians will have to take an initiative to improve their knowledge and stay up to date.



**'From the field'** is a series of interviews with service technicians to help them share their experience with the fraternity. The series is aimed at promoting mutual learning and camaraderie among RAC technicians.



The second technician to be featured in the series is New Delhi-based Azwar Hussain who works as a freelancer. In an interaction with newsTRAC, Hussain, 30, said that to keep abreast of the evolving RAC sector, technicians must continue updating their skills through training. Excerpts from the interview are shared below:



**What is the nature of your job?**

**Ans:** I work seasonally as an AC technician. In summers, I affiliate with AC companies for installation and maintenance work. During off-season, I work in the construction sector on underground piping



**Are you happy with your work? How would you rate your happiness on a scale of one to ten?**

**Ans:** I would rate my happiness at seven. You never know with this kind of a job. There are days when there is ample work and then there is a lull. The unpredictability and the seasonal nature are making me rate it at seven.



**How would you rate your happiness with your customer's conduct?**

**Ans:** I will rate it at nine. I mostly work with residential customers. They are polite and treat me nicely. I develop a relationship with them which makes them approach me for future maintenance and repair as well.



**Are you professionally trained?**

**Ans:** I learnt on the job. A company that hired me had trained me



**Do you feel your salary is adequate?**

**Ans:** Yes, I feel that it is adequate. Owing to the RAC servicing work during summers and the underground piping work during the rest of the year, I feel I earn enough.



**Do you feel your technical skills are adequate? How willing are you to learn more skills in this field?**

**Ans:** Everybody wants to learn. I, too, feel that I should learn more and continue upgrading my skill set. I install and repair ACs and I've observed that upgraded designs and technologies are entering the market. I might not know about them fully. Therefore, it is important to keep learning. For instance, the non-invertor ACs are completely different from regular ones. If the government helps us by providing training, it will be beneficial for all technicians. I wouldn't mind giving up on a day's work to attend a training session.



## EXPERT SPEAKS

Under this section, an expert will share his inputs on a day-to-day challenge faced by RAC technicians in the field. Service technicians can easily solve these problems and enhance the equipment's efficiency by following the step-by-step guide shared by the experts.

*Professor R.S Agarwal shares an easy-to-follow guide to solve the issue of inadequate cooling.*

**Often, technicians are assigned with the task of repairing an equipment with inadequate or no cooling. Following this simple step-by-step guide will help them to rectify the fault quickly and effectively.**

### **STEP 1 OBSERVE AND ANALYSE**

The first and foremost step involves observing and analysing the system thoroughly. Start by carefully reading the specification plate that is fixed on the outdoor unit and confirm the refrigerant type and quantity. Following this, you should check whether the indoor unit filters and the outdoor unit condenser are clean. If these two components are clean and still there is less cooling, then insufficient refrigerant is the cause of inadequate cooling if system compressor is operational.

### **STEP 2 UNPLUG BEFORE STARTING WORK**

Unplug the system from electricity supply before starting repair work. If the system is charged with flammable refrigerant then there is need to follow strictly safety measures as applicable for flammable refrigerants.

### **STEP 3 VISUALLY LOCATE THE LEAKAGE POINT**

Inspect the system. Are there any traces of oil on the system surface(s). The traces of oil or oily surface are an indicator of likely leakage point.

### **STEP 4 RECOVERY OF REFRIGERANT**

Often, the leakage is from high-pressure side which could be the condenser, service valve, flare connections or lines of the outdoor to indoor unit. As a good service practice, the leftover refrigerant should be recovered using a recovery machine or pump-down the refrigerant using system compressor or by passive recovery method. Never leak out the refrigerant into the atmosphere.

### **STEP 5 RELEASE OF HYDROCARBON REFRIGERANT**

Hydrocarbon refrigerants, like R-290, may not be recovered as there is no environmental impact of these refrigerants. Hydrocarbon refrigerants may be released into the atmosphere. Make sure that the refrigerant is released gradually and to a safe outside space.



## ALTERNATIVE REFRIGERANT RECOVERY METHODS

If you don't have a recovery machine, follow these methods to safely recover refrigerant

### METHOD I

- Close the service valve at the outlet of the condenser to the evaporator/ cooling coil of the indoor unit
- Start the compressor
- This will enable transfer of the refrigerant from the indoor unit to the outdoor unit.
- The pump-down refrigerant is reused

### METHOD II

- Carry a small cylinder
- Reduce its temperature by wrapping it in a wet cloth/ immersing in a bucket of water/rubbing ice around the cylinder
- Connect it to the service port and Put the cylinder at a lower level than the RAC system
- Due to gravity & temperature difference, the refrigerant will flow into the cylinder. This simple method would enable recovery of refrigerant.
- This process is called passive recovery. The recovered refrigerant can be used in the same system

### STEP 6 PRESSURE TESTING

Following refrigerant recovery, pressurize the system with dry Nitrogen and locate the leak. The test pressure should be at least 1.1 times the working pressure. Apply soap solution at the system joints to locate the leak. Alternatively, an electronic leak detector can also be used.

### STEP 7 SEALING OF THE LEAKING POINT BY BRAZING OR TIGHTENING THE LOOSE CONNECTIONS

While doing brazing use proper techniques of brazing and follow safety measures. Always use personal protection devices.

### STEP 8 REPLACE STRAINER/FILTER

Each time when system is repaired (opened for repair), replace the strainer/filter by same type as fixed on the unit. This would ensure contaminant free system and proper cooling.

### STEP 9 FLUSHING OF REFRIGERATION SYSTEM

The repaired system should be thoroughly flushed/cleaned using dry- nitrogen at 7 bar or 100 psig.

### STEP 10 TEST THE SYSTEM AGAIN

Fill dry nitrogen in the system and check for leak throughout the system. Keep the system under pressure for at least 15 minutes and observe for any drop in pressure to ensure there is no leakage left in the system.

### STEP 11 SYSTEM EVACUATION

Release the dry nitrogen and evacuate the system using two stage rotary vane vacuum pump to about 500 microns. If micron meter is not available, then evacuate system for at least 30 minutes after the Bourdon gauge reading shows -30 inches/-760 millimetre (at sea level) before charging/refilling the system with refrigerant.

### STEP 12 REFRIGERANT CHARGING

Charge refrigerant by weight, it is necessary for proper functioning of system where capillary is used as expansion device. The refrigerant and its quantity of charge should always be as per the product description given on the outdoor unit.

### STEP 13 SEALING OF UNIT

Tighten the service port properly, use soap solution to check and ensure that there is no leakage left in the system.

### STEP 14 SYSTEM PERFORMANCE

Plug in the system with electric supply and evaluate its performance. Run the system and measure the air temperature at the air supply grill and note that the system is giving desired cooling. Also check current drawn by the system. It should be as specified on the system name plate.

## GOOD PRACTICES



### CUSTOMER EDUCATION

To help save energy and keep the machine running well, the customer needs to know how to use the air conditioner correctly. If the customer is not familiar with air conditioners, they need to be told not to block the cooling coil or condenser exhaust with unwanted items. Never water plants in the air conditioned room as it makes it harder for the machine to cool the air and makes it necessary to run AC longer. Never hang wet clothes to dry in a room, as it will take longer for the appliance to cool the room and require higher energy consumption.

### CUSTOMER EDUCATION

Customers must never cook food in a room when the airconditioner is ON. The air-conditioner will run higher due to the extra heat consume more energy.



### DEALING WITH COMPLAINTS

A technician must be a good listener. He or she must listen to the customer very carefully and then offer a response. Even if the customer is wrong, the technician must explain politely why something has happened. Customer queries must never be ignored. Always be polite with the customer.





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