# newsTRAC

NEWSLETTER FOR TECHNICIANS IN REFRIGERATION AND AIRCONDITIONING (RAC) SECTOR

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## Inside...



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# Foreword

Dear Reader

The refrigeration and air-conditioning sector in India has seen significant changes in the past few years. The Government has a continuous focus on training and skilling RAC technicians. Through the key programmes such as HCFC Phaseout Management Plan (HPMP) Stage II and Skill India Mission-Pradhan Mantri Kaushal Vikas Yojana (PMKVY) knowledge on good servicing practices and new alternative refrigerants to ozone depleting chemicals is being imparted to service technicians.

Recovery of refrigerant is an important good servicing practice and is a starting point for refrigerant management. Recovery of refrigerants and responsible refrigerant management have significant positive environmental outcomes. Practicing of refrigerant recovery while servicing refrigeration and air-conditioning equipment minimize the scope of venting of refrigerants. The current issue of News TRAC focusses on these aspects. There are two separate articles covering these topics.

We are in the midst of COVID- 19 pandemic. Globally COVID- 19 has impacted all spheres of human activity. The summer season in the country is linked with operation of air conditioning systems and thus the role of service technicians in smooth operations these systems. COVID- 19 has impacted the way RAC service personnel need to operate.

The Indian Society of Heating, Refrigeration and Air Conditioning Engineers (ISHRAE) has brought out a "COVID-19" Guidance Document for Air – Conditioning and Ventilation" which covers operation of air- conditioning and ventilation systems to control spread of "COVID- 19" in residences, work spaces and health care facilities. This document has a separate section on "Guidance for Service Technicians" giving Do's and Don't'. The Do's and Don't has been adapted and presented as an infographic in this issue for benefit of RAC service technicians working in the field.

I Congratulate The Energy and Resources Institute, GIZ-Proklima, the United Nations Environment Programme and the contributing authors for bringing out the 10th issue of the News TRAC.

My best Wishes to all News TRAC readers.

Geeta Menon
Joint Secretary
Ministry of Environment, Forest & Climate Change

# REFRIGERANT RECOVERY

***Ms. Smita Vichare, GIZ-Proklima***

Ozone is a triatomic form of unstable oxygen molecule "O3", occurs naturally in upper atmosphere, stratosphere, about 15-60 km above earth's surface. Ozone has a strong odour and is of blue colour. Ozone absorbs the sun's harmful UV-B radiation plays a vital role by shielding humans and other forms of life on the Earth from harmful ultraviolet rays from the Sun. While stratospheric ozone which protects the earth from the sun is good, the ground level ozone produced due to atmospheric pollution in cities is harmful for human health. With the increased industrial activities, in the past several decades, man-made chemicals such as CFCs, HCFCs and other chemical compounds containing chlorine and bromine elements that were increasingly released into the atmosphere, contributed to the depletion of this important protective layer.

Refrigeration and Air-conditioning (RAC) is an important and unique sector where refrigerants are not only used in newly manufactured appliances/equipment but also required for servicing the existing systems during their useful working life. The refrigerant for servicing remains a critical recurring demand and consequently contributes emissions to the environment. Thus, the servicing sector is responsible for maximum consumption of refrigerant in the RAC sector across the world.

Depletion of the ozone layer and global warming are the two major environmental concerns associated with the refrigerants used in room air-conditioners. Room air-conditioner contributes a significant quantity of the greenhouse gas (GHG) emissions and thus global warming impact to the environment as it is a major energy consuming appliance in a house. The GHG emissions associated with the energy consumption while operating the air- conditioner and the refrigerant emissions during and at the end of equipment life are contributions to global warming resulting from air conditioning applications. Although HCFC- 22 refrigerant is being phased out under HCFC Phase-out Management Plan (HPMP), it is a widely used refrigerant because of its excellent thermodynamic and thermos-physical properties. This refrigerant is not only ozone depleting substance, but also have a high global warming potential (GWP) of HCFC-22 is 1810. The emission of refrigerant occurs during its use in manufacturing, and servicing of air-conditioners, like charging refrigerant into the system, improper recovery of refrigerant and leakage from the air-conditioning system and the lines. As most of the room air-conditioners used currently are charged with HCFC-22, it is very important for the service technician to minimize the emission of HCFC-22 as much as possible during installation and servicing of air-conditioner and to recover the refrigerants instead of releasing the same in the environment.

During servicing or repairing of air-conditioners following steps as Good Service Practice must be followed. All steps are necessary and must be followed to minimize the refrigerant emission from room air-conditioners, in the given sequence.

1. Recovering refrigerant from the sealed refrigeration system or venting and removal of leftover refrigerant like R-290 which has insignificant impact on environment.
2. Repairing/replacing inoperative spare parts
3. Cleaning/polishing and flushing the system
4. Careful brazing and/or flaring of tubes
5. Leak and pressure testing
6. Evacuation and vacuum holding
7. Refrigerant charging
8. Sealing the process tube and/or closing the valves
9. Routine checking for proper operation
10. Recording the details of work done

## Refrigerant Recovery

Air-conditioners are designed to operate with a fixed amount of refrigerant charge. If it has been detected that a system has insufficient refrigerant, the system must be checked for leaks, then repaired and recharged. Recovery of refrigerant is one of the steps of good service practices to remove refrigerant from room air-conditioner and temporarily store refrigerant that has been removed from the system to be repaired or serviced or disposal. The HCFC-22 refrigerant should not be vented out due to environmental issues, also for proper and efficient functioning of the refrigeration and air-conditioning (RAC) equipment, the refrigerant should be properly charged. Recovery and reuse of recovered refrigerant by technician while servicing can be reduced significant amount of refrigerant consumption as well as environment benefits.

## Methods of Recovery

Refrigerant can be recovered from the system in following ways

### Passive Method:

The recovery method with no external recovery machine used. Movement of refrigerant due to natural difference in pressure between system & recovery cylinder.

- Charge migration method: Refrigerant will flow/move due to natural difference in pressure between system & recovery cylinder. Only a small percentage of charge can be recovered with this method.
- Use of system compressor: Process can be speeded up by, evacuating recovery cylinder or placing recovery cylinder in ice bath. Pump out refrigerant using System compressor as vapour if service valve is used or as liquid from condenser exit.

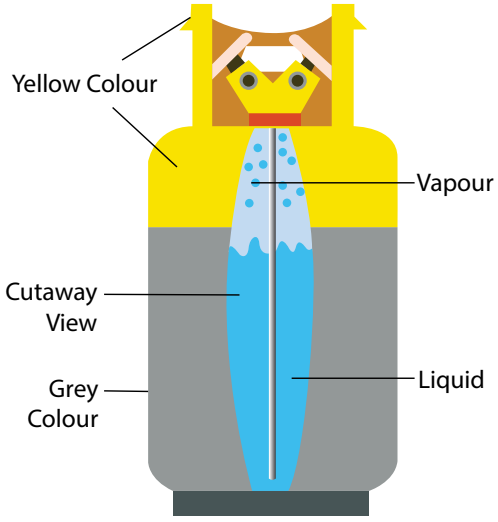
These methods should not be used because significant percentage of refrigerant will be left in the system after recovery

## Active Method:

Recover refrigerant with a recovery machine into the recovery cylinder. Simple Recovery Machine or Recovery Machine with Oil Separation are used in this method. Simple Recovery Machine recovers refrigerant as vapour and refrigerant vapour condensed before entering recovery cylinder. Recovery Machine with Oil Separation, this separates oil from system using oil separator and oil from recovery machine compressor returned back to compressor

Before starting the recovery of the refrigerant, the technicians first need to identify the refrigerant type and quantity in the system he is servicing. He should ensure that he has with him the recovery unit and cylinder. Also, must keep all the required tools such as safety gloves, 3/8" or ¼" diameter short length hose pipe

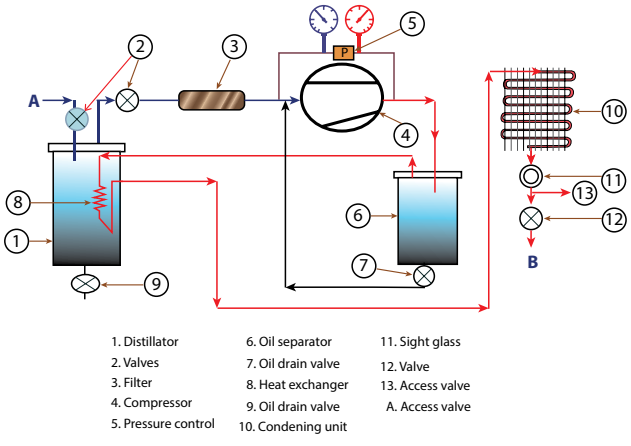
It is advised to have at least one recovery cylinder for every refrigerant type serviced so that the recovered refrigerant can be put back into the same system after completing the service, plus an extra cylinder for burnouts refrigerants and other unknowns. One should be careful in selecting the cylinder for different types of refrigerant. Disposable cylinders are not safe for refilling. Only clean cylinders, free from contamination by oil, acid and moisture etc. must be used. It is also advised that only certified cylinders should be used, and they should be checked visually before using.




Recovery Cylinder

An approved in-line filter to be used to prevent contaminants from entering the system. The refrigerant is removed from the system in its present condition and stored in a cylinder. For recovering refrigerant from the system vapour recovery method or liquid recovery method can be used.

The cylinder should not be filled more than 80% of the rated capacity by volume. Different refrigerants should not be mixed in one cylinder. Also never recover one refrigerant into a cylinder meant for some other refrigerant. The cylinders must be labelled with information about the refrigerant its number, name, weight of the cylinder and the total weight with date. It is important to evacuate the recovery cylinders and purge the hoses to avoid contamination or introduce non-condensable gases that would increase the discharge pressure. The figure here below shows a schematic diagram of simple vapour recovery machine. The various components are systematically shown for ease of understanding. It may be noted the system configuration of recovery machine to machine may vary due to design features. However, working principle remains the same. Check operation manual to find the proper configuration for the unit.




Recovery Unit

Some of the essential aspects to be followed for proper functioning and use of recovery machine:

- Confirm that the recovery unit was not used for recovering any other refrigerant other than refrigerant to be recovered. If so, it needs to be evacuated properly.
- Use only certified recovery cylinders.
- Wear safety gloves and goggles while recovering.

- Start the system and run it for 5 minutes to warm up the compressor. This will release the refrigerant mixed with the compressor oil.
- Turn off the system.
- Connect a hose from the service port of the vapor line valve to the gauge manifold (Low side) Connect another hose from the gauge manifold to the inlet of the recovery unit and from the recovery unit outlet to the recovery cylinder.
- Open the service valve of the system and carefully purge the lines upto the inlet of the recovery machine from service valve.
- Open the inlet valve of the recovery machine.
- Turn the selection knob to recovery mode.
- Open the outlet valve of the recovery unit and purge the line connected to the recovery cylinder.
- Place the recovery cylinder on a weighing scale and record the initial weight.
- Open the cylinder valve.
- Start the recovery unit and run it until the suction pressure drops to -20" Hg.
- Wait for a while, if the pressure increases, start the recovery unit and recover until the pressure drops to -20" Hg. Record the final weight. Never fill a cylinder more than 80% of its capacity.
- Fill the system with Oxygen Free Dry Nitrogen (OFDN) to break the vacuum and maintain a positive pressure of 2 to 5 psig.
- Close the service valve on the ODU.

## Suggested Guidelines for Refrigerant Recovery

One of the most important aspects of refrigerant recovery is safety. One must have the proper equipment for the type of refrigerant you're recovering. Use PPEs and make sure the manifold gauges are rated for the refrigerant pressure one is working with.

Charges up to 400 gm -Passive method, (i.e. no recovery machine) can be used, charges greater than 400 gm -better to use active methods (i.e. using recovery machine)

A filter dryer must always be used between the recovery machine and its inlet hose. Special care should be taken when recovering from a 'burnt-out' air-conditioner. Two high acid capacity filters in series are to be used. Contaminated recovered refrigerant should be kept separately for multi pass recycling or reclamation or destruction.

In case of under recovery of refrigerant, it may be due to presence of non-condensable gases in the recovery unit or recovery cylinder. Purge all hoses properly and evacuate the recovery cylinder.

After recovery of the refrigerant from the system is complete, it is to be flushed with a small amount of Oxygen Free Dry Nitrogen (OFDN) or clean refrigerant and lubricant to purge off any foreign materials left inside.

The refrigerant is to be always removed into the external storage cylinder. Always use recovery cylinder not disposable cylinder

For efficient functioning of the recovery unit proper use and regular maintenance is necessary. The compressor can fail and will need replacement if the machine is used on a regular and extensive basis. Therefore, it is recommended that a spare compressor is kept ready for this purpose.

# HPMP RPL PROJECT IMPACT ASSESSMENT AND CURRENT TRAINING SCHEDULE

***N K Mohapatra, CEO, Electronics Sector Skills Council of India***

The Ministry of Environment Forest and Climate Change (MoEFCC) and Ministry of Skill Development and Entrepreneurship (MSDE) is jointly undertaking the upskilling and certification of 100,000 RAC service technicians on good servicing practices and knowledge of alternative refrigerants to ozone-depleting chemicals under the HCFC Phase out Management Plan (HPMP) Project under the Recognition of Prior Learning (RPL) Type 3 of the Pradhan Mantri Kaushal VikasYojana- PMKVY 2.0.

To measure the impact of the initiatives of HCFC Phase out Management Plan (HPMP) Project, ESSCI engaged the Indian Institute of Corporate Affairs to conduct an assessment , to derive a holistic view from the targeted beneficiaries about the HPMP project and to see environmental benefits and influence on the livelihoods of technicians.

The methodology adopted for this assessment was a mixed method approach which involved qualitative as well as quantitative methods. After conducting detailed literature review, IICA team conducted telephonic interview of sample beneficiaries and analysed the primary data using statistical software followed by interpretation and logical conclusions.

Subsequently, the officials visited10 training centres across India for physical inspection of the centres and verification of the data collected through telephonic interviews from the beneficiaries during the course of this assessment. With respect to the qualitative data, a zone-wise SWOC (strengths, weaknesses, opportunities and challenges) analysis was conducted to provide a realistic, fact-based, data-driven findings of the project, and its impact.

The assessment of certain measures was carried out by IICA. Indicators such as trainings undertaken at the centres, infrastructure available at the training centres, quality of trainers and assessors available at the centres and direct feedback from the trainees. The assessment report found the Training was successfully conducted as per the schedule at all the ten centres and after making an assessment advised certain steps to improve the programme.

The beneficiaries have indicated that theoretical and practical sessions were conducted as per the schedule and the satisfaction level on most of the lectures based on topics such as: safety and first aid, refrigerant recovery, alternative refrigerants and lubricants, installation and services of window air conditioner & tools, impact of refrigerants on environments, were quite high among the respondents which is received through the call validation.

It can be stated that the majority of technicians joined RPL training program for upskilling training and certification. While reviewing the access of infrastructure available at the training centres through physical verification, it was found that each centre had different set of findings with respect to the size of classroom, availability of equipment's, first-aid facility etc. for which zone wise detailed analysis has been provided in the SWOC analysis conducted for the 10 centres visited.

The next allocation of 40,000 numbers were done in mid-January 2020 and the programme is under implementation with an active number of centres conducting the training across the country.

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| | AP IT Academy | Srikakulam | H.No:15-109 Church street, somepet villege and post,Somepeta mandal,srikakulam Dist-532284<br>Email: shritech042@gmail.com<br>Ph.: +91-9866790868 |
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| | AP IT Academy | Kurnool | H.No:-29-196, Opp: Taluka Office, Near II Town Police Station, Nandyal, Kurnool District, Andhra Pradesh – 518501<br>Email: pmkk.nandyal2@gmail.com<br>Ph.: +91-9393868600 |

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| Andhra Pradesh | AP IT Academy | Krishna | Door No: 1-3/18-42, Opposite to Kirana Marchents Association Kalyana Mandapam,Talluri Vaari Veedhi, Vidhyadhara Puram, Kummaripalem, Vijayawada<br>Email: eashantechnologies@gmail.com<br>Ph.: +91-7013575873 |
| | AP IT Academy | Srikakulam | Opp Apsara Theater ,Baba Nagar, Rajam(Vill), Srikakulam (Dist)-532127<br>Email: nitrajam17@gmail.com<br>Ph.: +91-9493045467 |
| | Chaitra 7 Colors Entrepreneurs | Chittoor | C/O Sri Sai Srinivasa ITI, D No: 12-55-1, Surinenivari Street,Surineni Plaza,SBI Settipalli Back Side, BBR Layout,Renigunta-510506<br>Email: srinivasulurudrapati52@gmail.com<br>Ph.: +91-6303638582 |
| | Chaitra 7 Colors Entrepreneurs | Visakhapatnam | C/O Swathi ITC,Sector - 5,Behind Laddu Gopal Street,M.V.P. Colony, Visakhapatnam – 560017<br>Email: chinnareddy60@gmail.com<br>Ph.: +91-9246616195 |
| | Chaitra 7 Colors Entrepreneurs | Prakasam | PNCA Degree College Campus,Somarajupalli Rtoad,Somarajupalli (V), Singarayakonda Mandal, Prakasam District – 523101<br>Email: smshaik1992@gmail.com<br>Ph.: +91-7386579299 |
| | Chaitra 7 Colors Entrepreneurs | Nellore | RSR Engineering College ,Kadanuthala,Bogole Mandal,Nellore –524142<br>Email: muralibandi.999@gmail.com<br>Ph.: +91-7013234553 |
| | MARC Enterprises | Kakinada | T-2, Alayam Towers, Beside Safe Hospital, Idea Show Room upstairs, Bhanugudi Junction, Kakinada-533003<br>Email: cubevijaywadatc1@gmail.com<br>Ph.: +91-9347779999 |
| | JRS Technology Private Limited | Krishna | 9-83/A, Near Sivalayam, Enikepadu, NH-5, Vijayawada, Krishna, Andhra Pradesh – 521108<br>Email: jrst.krishnaap@gmail.com<br>Ph.: +91-7084721835 |
| | KKR Foundation | Krishna | H.No 42-26-15,The Pvt Elect Association building,Beside Vani School,Machavaram Down,Elur Road,Vijayawada-520004<br>Email: kkrfmachavaram@gmail.com<br>Ph.: +91-9121705479 |

# REFRIGERANT MANAGEMENT FOR ENVIRONMENT PROTECTION

***Shaofeng Hu, Alvin Jose & Fahad Naim, UN Environment***

Hydrochlorofluorocarbons (HCFCs) are one kind of Ozone Depleting Substances (ODSs) that are widely used in refrigeration and air conditioning (RAC) applications worldwide. It is used for domestic and commercial refrigeration, cold storage, food processing, transport and industrial refrigeration, air conditioning and heat pumps, and chillers. Under the Montreal Protocol, HCFCs are being phased out globally and countries are trying to transition towards low-GWP (global warming potential) alternatives with higher energy efficiency potential.

An appropriate mixture of the support measures under the Montreal Protocol and the coordinated refrigerant management may ensure the successful phase-out of HCFCs in the RAC servicing sector. Refrigerant Management encompasses refrigerant awareness and proper handling throughout the entire chain, from transport and storage to good servicing practices, including recovery and recycling, and proper end-of-life disposal. Good refrigerant management can only be achieved by skilled technicians that have the awareness, skills and knowledge related to each class of the refrigerants that they work with. This is particularly crucial in developing countries where the overwhelming majority of the consumption of ODS is in the RAC servicing sector, and where RAC plays a key role of being an economic backbone of those societies.

In past, there has been an increasing emphasis on conservation of refrigerants and the reduction of emissions that has led the industry to develop a specific terminology which is used in this article:

a. **Recovery:** The collection and storage of controlled substances from machinery, equipment, containment vessels, etc., during servicing or prior to disposal.
b. **Recycling:** The re-use of a recovered controlled substance following a basic cleaning process such as filtering and drying. For refrigerants, recycling normally involves recharge back into equipment and often occurs "on-site";
c. **Reclamation:** The re-processing and upgrading of a recovered controlled substance through mechanisms such as filtering, drying, distillation and chemical treatment in order to restore the substance to a specified standard of performance. It often involves "off-site" processing at a central facility.

Conservation of refrigerants is becoming an integral part of servicing practices in most countries, especially for systems that have relatively large charge quantities. Recovery, Recycling and Reclamation (RRR), as part of refrigerant conservation, need to have certain criteria in place to ensure its success. The incentives for RRR are related to the cost of refrigerants, as well as to environmental protection in a broad sense.

The need for the RRR system depends on factors such as:

- The commitment to protect the ozone layer and climate
- Availability of virgin HCFCs and price competitiveness with recovered/reclaimed HCFCs in the open market
- The retrofitting/replacement option with non-HCFCs alternatives and their cost benefit in comparison to continued operation of HCFC based equipment
- The lifetime of existing HCFC based equipment and their dependency in important industry sectors, in context of their imminent phase out
- The compliance constraints for the supply of HCFCs and the country needs for servicing of existing HCFC using equipment

Appropriate RRR systems should be selected based on performance criteria such as environmental impact, cost-effectiveness and profitability.

Typically, RRR systems require the following types of equipment:

1. Recovery Machines: Recovery machines are used to recover refrigerant from refrigeration or air-conditioning systems to be serviced or decommissioned. The recovered refrigerant is pumped into a cylinder for storage.
2. Recycling Machines: Recycling machines clean the recovered refrigerant to a given standard – they are usually certified. The recycled refrigerant is pumped into a refillable cylinder. Most recycling machines are also equipped to recharge the recycled refrigerant back into the serviced refrigeration system.
3. Recovery Cylinder: The residual refrigerant from the system to be serviced should not be vented into the atmosphere when fresh refrigerant is being filled. Always collect this in a refrigerant recovery cylinder. This cylinder is equipped with a double valve for liquid and vapour refrigerant transfer.
4. Reclaim stations: Reclaim stations have reclamation machines to upgrade contaminated or mixed refrigerant to international quality standards for virgin refrigerants. These standards require strict quality control and access to advanced chemical analysis devices such as a gas chromatograph.

5. Leak detectors: Electronic leak detectors can detect the presence of very small quantity of refrigerant leakage, which cannot be usually detected by traditional methods, for example soapy solution. The detectors should be used before the recovery of the refrigerant and the repair of the system.
6. Refrigerant Identifier: This equipment identifies the type of recovered refrigerant to be recycled and indicates if refrigerants have been mixed together. Recycling centers, which receive recovered refrigerants from a variety of workshops, require the device.
7. Hand Tools: Different types of hand tools and accessories are needed for recovery and recycling operations, including hoses, valves, gauge manifolds, micron gauges, hollow punches, etc.

Other pieces of equipment used for refrigerant recovery and recycling are weighing scales and filters for the recycling machines.

Successful RRR (Recover, Recycle and Reclaim) systems will make recovered or recycled refrigerant available for reuse, which will reduce the need for virgin HCFCs refrigerants and allow existing HCFC-based equipment to operate until the end of their economic life. This is particularly important as virgin HCFC refrigerants are expected to become increasingly scarce and expensive globally due HCFCs phase-out schedule of the Montreal Protocol.

## References:

1. UN Environment - Recovery and recycling systems guidelines: phasing out ODS in developing countries, refrigeration sector. https://www.unenvironment.org/resources/report/recovery-and-recycling-systems-guidelines-phasing-out-ods-developing-countries
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3. Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee 2018 Assessment Report. https://ozone.unep.org/sites/default/files/2019-04/RTOC-assessment-report-2018_0.pdf

**'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.**

**Avijit Sarkar, 26 works as a multi-skill technician. In an interaction with newsTRAC, he talks about his zeal to learn more about the field and the challenges which hinder him from accessing new avenues. Excerpts from the interview are shared below**

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

**Ans:** I have a permanent job with an official solutions company where I work as a multi-skill technician. Depending on the need, I work as an AC service and maintenance person and electrician.

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

**Ans:** I would rate it at 6. I want to learn more and grow as a professional. There is a long way to go.

**How would you rate your happiness on your organisation's conduct?**

**Ans:** I would rate it at 4. My salary has almost been stagnant for over a year. However, my work has increased. I don't get paid for overtime work. I am the only earning member in my family.

**Do you work with residential customers as well?**

**Ans:** At times, I work in the residential sector to install ACs, lighting equipment and electrical wiring. However, given the workload at my regular job, I don't get too much time to work with residential customers.

**Are you professionally trained?**

**Ans:** I have completed a 6-month course from the Ramakrishna Mission Shilpavidyalaya which is a private Industrial Training Institute. I am a licensed electrician. However, I learnt about AC repair and maintenance largely on the field and while observing other AC technicians.

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

**Ans:** No, I received a miniscule hike in my salary over a year. It is as good as stagnant, but the work has increased. I am the only earning member in my family. I do not feel my current salary is adequate.

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

**Ans:** I don't think my skills are adequate. I definitely want to learn more. Everyday new technology in air conditioning is coming to the market. To keep abreast, one should keep learning. I want to learn more and grow as a professional.

**Would you be interested in undergoing trainings for RAC technicians to hone your skills?**

**Ans:** Yes, I want to learn more about AC servicing and maintenance. However, I am unaware of the current trainings and money is also a constraint. I cannot spend much to undergo these trainings. But I will be more than willing to explore free training and certification options.

# COVID-19 Pandemic: Recommended safety measures for Refrigeration and Air-Conditioning Service Technicians

The COVID-19 pandemic has caused significant healthcare, social and economic upheaval. The government has been working towards breaking the chain in transmission through measures such as a nationwide lock down and issuance of guidelines for the citizens, to ensure their well-being and safety.

However, it is critical for those involved in the service sector to adhere to certain norms, for their own protection and that of their consumers. With the advent of summers, the Refrigeration and Air-Conditioning (RAC) service technicians will now be engaging in servicing air-conditioning units across the nation. The Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE) has released comprehensive guidelines "ISHRAE COVID-19 Guidance Document for Air Conditioning and Ventilation" on 13th April, 2020 to control the spread of COVID-19 in residence, workspaces and healthcare facilities from the AC and Ventilations system operations (https://ishrae.in/mailer/ISHRAE_COVID-19_Guidelines.pdf ). These guidelines have been adapted to develop this info-graphic. The service technicians should keep the following practices in mind whilst servicing and also follow Government Guidelines, as applicable.

## DO'S & DON'TS

### DO'S

- Wash your hands thoroughly using soap before and after servicing for 20 seconds
- Carry company ID and authorization letter
- Always wear a face mask/ face cover and gloves
- Use prescribed Personal Protection Equipment (PPE)
- Avoid personal contact, including handshakes
- Check for home quarantine stickers in the home you are going to
- Carry your own water bottle and food
- Carry sanitary bag for safe disposal of replaced items
- Keep all your equipment clean & sanitized
- Keep a hand sanitizer/alcohol rub handy
- Maintain social distancing and maintain a distance of 1 meter from the consumer
- Practice personal and social hygiene
- Perform a temperature check before heading out
- Report to your manager/senior if you feel unwell or display COVID-19 like symptoms
- Sanitise your private vehicle
- Encourage online payments

### DON'TS

- Touch your eyes, nose and mouth unnecessarily
- Use alcohol based sanitizer if working with electrical equipment
- Use public transport
- Go out for servicing if you have fever/cough
- Cough or sneeze near the consumer, without covering your face
- Spit outside
- Step out for servicing if you are older than 60, or immuno-compromised
- Touch any surfaces unnecessarily in the household that you are servicing
- Enter quarantined premises
- Share pen for customer signature
- Use other's PPE and crash helmet

## Ready Reference for Good Servicing Practices Videos

Installation of Split AC

Flammable Refrigerant Handling

Good Service Practices

Recovery, Recycling and Reclamation


Ministry of Environment, Forest & Climate Change Government of India

**For further information**
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