

International Training and Certification Standards for RACHP: Advancing Energy Efficiency and Preventing Refrigerant Emissions

Wednesday 9th July 2025, 1:00-3:00 pm

Theatre, OEWG47, UNCC, United Nations Building, Bangkok



INSTITUT INTERNATIONAL DU FROID
INTERNATIONAL INSTITUTE OF REFRIGERATION



Agenda – Speakers' lineup – Moderated by **Marco Buoni**

- Opening Remarks & Welcoming Speech by **Marco Buoni**
- **Marco Duran**, International Institute of Refrigeration (IIR)
- **Stephen Andersen**, Institute for Governance & Sustainable Development (IGSD)
- **Marco Buoni**, Centro Studi Galileo (CSG), Associazione Tecnici del Freddo (ATF) and Air conditioning and Refrigeration European Associations of contractors (AREA)
- **Baolong Wang**, Chinese Association of Refrigeration (CAR)
- **Youssef Hammami**, National Ozone Unit Tunisia (NOU Tunisia)
- Q&A Session and Interactive Discussion
- Closing Remarks



Opening Remarks & Welcoming Speech

by Marco Buoni





INSTITUT INTERNATIONAL DU FROID
INTERNATIONAL INSTITUTE OF REFRIGERATION

TRAINING AND CERTIFICATION – INTERNATIONAL PERSPECTIVE

Marco DURAN | Head of Policy and
Global Partnerships

OEWG47 - International Training and Certification Standards for RACHP: Advancing Energy
Efficiency and Preventing Refrigerant Emissions Side Event
Wednesday 9th July 2025, 1:00-3:00 pm

Outline



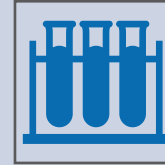
International
Standards



Regulation and
Certification Approach



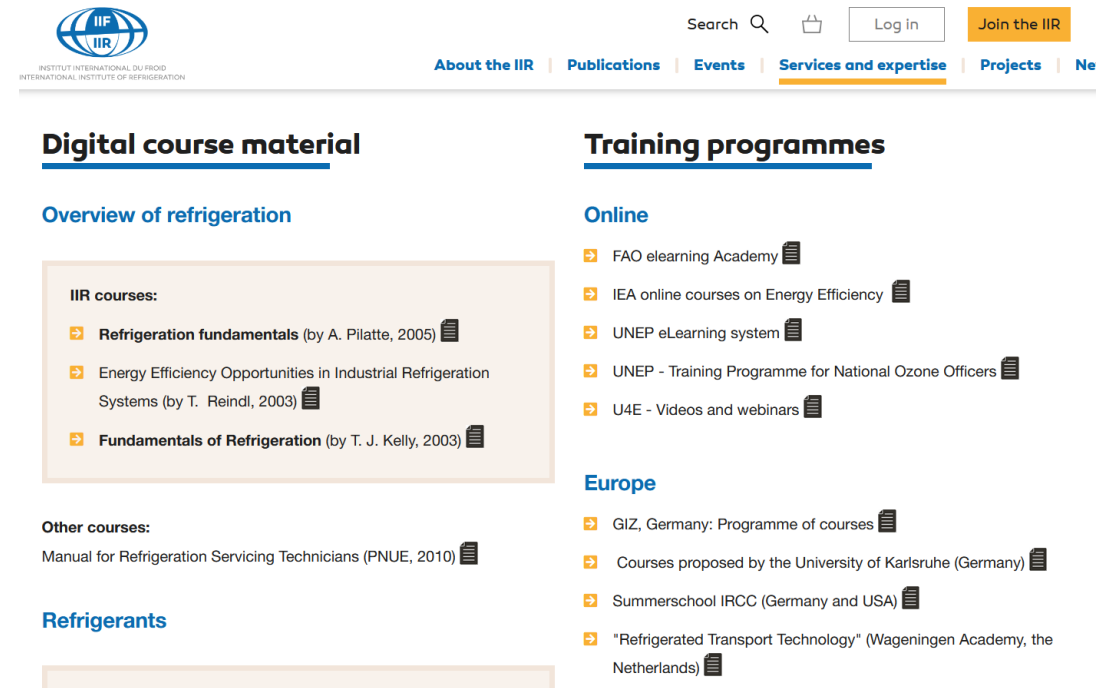
Mandatory and
Voluntary Certification



IIR Working Group -
Careers in
Refrigeration “CaRe”

Introduction

- Technician enables proper handling of refrigerants and system maintenance.
- Certifications ensure technicians are trained in safety, environmental compliance, and technical skills.
- Common focus: refrigerant handling, system diagnostics, and energy efficiency.
- The **IIR** has **database** on courses and training



The screenshot displays the IIR website's navigation and content sections. At the top, the IIR logo is on the left, and a search bar, login button, and 'Join the IIR' button are on the right. A horizontal menu below the logo includes links for 'About the IIR', 'Publications', 'Events', 'Services and expertise' (which is highlighted), 'Projects', and 'Ne'. The main content area is divided into two columns. The left column, titled 'Digital course material', contains a sub-section 'Overview of refrigeration' which lists 'IIR courses' (Refrigeration fundamentals, Energy Efficiency Opportunities in Industrial Refrigeration Systems, Fundamentals of Refrigeration) and 'Other courses' (Manual for Refrigeration Servicing Technicians). Below this is a 'Refrigerants' section. The right column, titled 'Training programmes', lists 'Online' programmes (FAO elearning Academy, IEA online courses on Energy Efficiency, UNEP eLearning system, UNEP - Training Programme for National Ozone Officers, U4E - Videos and webinars) and 'Europe' programmes (GIZ, Germany; Programme of courses; Courses proposed by the University of Karlsruhe (Germany); Summerschool IRCC (Germany and USA); 'Refrigerated Transport Technology' (Wageningen Academy, the Netherlands)).



Standards, Regulation and Certification: International Overview

- **International standard:** ISO 5149-4:2022 & ISO 22712 (international)
- Other reference standards: ANSI/ASHRAE 15-2024 (US), Standard ANSI/IIAR 8 (US ammonia)
- **Certification approach:** National / Regional regulation or voluntary (International e.g. ASHRAE, IIAR)
- Regulation examples: EPA 608 (USA) and F-Gas 2024 (EU), Australia AS/NZS 5149:2016 (based in ISO),



ISO 5149-4:2022 – Part 4

Refrigerating systems and heat pumps — Safety and environmental requirements.
Part 4: Operation, maintenance, repair and recovery

- **Scope:** Focuses on **safety and environmental requirements** for the **operation, maintenance, repair, and recovery** of refrigerating systems and heat pumps.
- **Key Features:**
 - Covers **all types of refrigerants**, including natural and synthetic.
 - Emphasizes **safe handling, leak prevention, and environmental protection**.
 - Aligns with other ISO standards (e.g., ISO 5149-1 to -3) and EN 378 series 1
 - Does **not** apply to motor vehicle air conditioners.
- **Purpose:** Minimize risks to people, property, and the environment from refrigerant handling and system failures.

ANSI/ASHRAE 15-2024 (US)

Safety Standard for Refrigeration Systems, packed with Designation and Safety Classification of Refrigerants (Standard 15-2024 packaged w/ Standard 34-2024)

- **Scope:** ASHRAE Standard 15 specifies requirements for the safe design, construction, installation, and operation of refrigeration systems. modifies requirements for handling, transportation, and storage of flammable refrigerants.
- **Key Features:**
 - Covers **CFCs, HCFCs, HFCs, and blends.**
 - Covers aspects of **flammable refrigerant** use, clarifies requirements related to pressure relief devices
 - Occupational exposure limit (OEL), clarifying toxicity data, and revising application requirements
- **Purpose:** Establishes performance criteria for refrigerant recovery equipment.

EU 2024/573 – F-Gas 3.0 Certification

- Introduces mandatory certification and training for technicians handling fluorinated greenhouse gases (F-gases)
- Expands the scope to cover **alternative refrigerants** (e.g., CO₂, hydrocarbons, ammonia)
- Covers installation, servicing, and decommissioning
- Focus on climate protection and leak prevention.
- Approved centres for each member country. E.g. Italy is Centro di Studi Galileo



USA – Environmental Protection Agency 608

- **Scope:** U.S. regulation under the **Clean Air Act**, enforced by the **EPA**
- **Key Features:**
 - Requires **certification** for anyone servicing or disposing of appliances containing **ozone-depleting substances (ODS)** or **HFCs**.
 - Four certification types (Type I–IV) based on equipment handled.
 - Emphasizes **refrigerant recovery**, **leak repair**, and **recordkeeping**.
 - Updated to include **HFCs** under the AIM Act.
- **Purpose:** Prevent emissions of refrigerants that deplete the ozone layer or contribute to climate change.



International Institute of All Natural Refrigerants

- Standards on safe design, installation, standard for inspection:
- Procedures for Closed-Circuit Ammonia Refrigeration Systems
- Safety Management & Risk Management Program Guidelines
- **Standard ANSI/IIAR 8** (for ammonia system decommissioning)
- Training and certification

https://www.iiar.org/IIAR/iiar/Education/IIAR_Education.aspx



China – Vocational Training & CAR

- Voluntary
- HVAC training integrated into vocational colleges
- Chinese Association of Refrigeration (CAR) provides training and certification:
 - Peer-reviewed and voluntary, targeting professionals in refrigeration, air conditioning, and related fields.
 - Varies by level (e.g., 2 years for Intern Engineer, 5 years for Engineer).
 - Supports training via universities and technical schools.



中国制冷学会
Chinese Association of Refrigeration

科学普及

Africa – Regional Programs

- South Africa is a regional leader in HVAC training and certification. ACRA (Air Conditioning and Refrigeration Academy South Africa): Accredited academy offering apprenticeships, trade testing, and refrigerant training.
- Programmes such as EU Sophia, GIZ training programmes
- **Africa Centre of Excellence for Sustainable Cooling and Cold Chain Systems** provides training



Latin America – Technical Institutes

- Certification varies by country.
- Training through technical institutes and manufacturer-sponsored programs.
- International certifications (e.g., EPA 608, ASHRAE) gaining popularity.
- Emphasis on practical skills and environmental compliance.

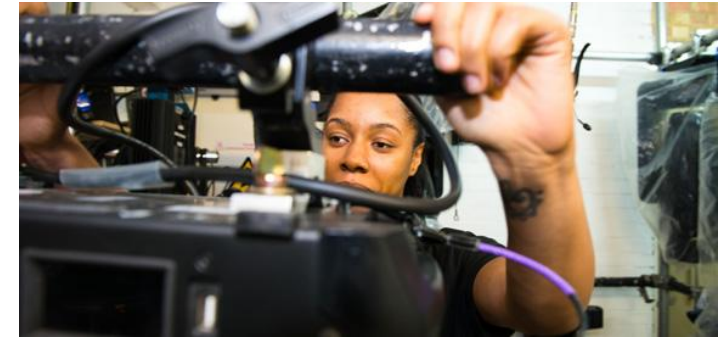
IIR Working Group - Careers in Refrigeration “CaRe”

Mission: Promote careers in refrigeration and cooling, especially among **young people and women**, by:

- Reversing the predicted shortage of engineers in the field
- Raising awareness of the **importance of refrigeration** in daily life and sustainability
- Creating **employment opportunities** and addressing barriers to entry

Key Objectives

- Develop international and national strategies to attract youth
- Foster collaboration among stakeholders: industry, academia, and government
- Highlight **social, economic, technical, and environmental** aspects of refrigeration careers



Conclusion

- Certification is essential for safe, efficient, and compliant HVAC systems.
- Enforce technician certification for refrigerant handling.
- Support training infrastructure and vocational education.
- Global collaboration can harmonize standards and improve outcomes.
- Governments play a key role in supporting and enforcing certification programs.



INSTITUT INTERNATIONAL DU FROID
INTERNATIONAL INSTITUTE OF REFRIGERATION

Join us!



HANDBOOK OF BEST PRACTICES

ROOM AIR CONDITIONER INSTALLATION
FOR THE LOWEST CARBON FOOTPRINT



Best Practice Installation of Room Air Conditioners (RACs) For the Lowest Carbon Footprint

Presented by Stephen O. Andersen (IGSD),
Marco Buoni (Centro Studi Galileo), and
Denise San Valentin (CCAC)

Montreal Protocol

2025 Open-Ended Working Group



CENTER FOR
ENVIRONMENTAL
ENERGY ENGINEERING



CENTRO
STUDI
GALILEO



CLIMATE &
CLEAN AIR
COALITION
TO REDUCE SHORT-LIVED
CLIMATE POLLUTANTS



New Handbook of Best Practices For Room Air Conditioners (RACs)

- Authored by Dr. Yunho Hwang and Dr. Stephen O. Andersen
- Sponsored by the Center for Environmental Energy Engineering - University of Maryland (CEEE), Climate and Clean Air Coalition (CCAC), Centro Studi Galileo (CSG), and Institute for Governance & Sustainable Development (IGSD)
- Edits and Additions are welcome - s.andersen@igsd.org; Specify whether you wish to be listed as a contributor or to be anonymous
- Each edition is issued under a Creative Commons License to reuse so long as attributed to the original authors
- Please be sure to frequently download the latest addition
- RAC Manufacturers are welcome to incorporate the best practices in their installation instructions included with the RAC equipment and are encouraged to join the team of contributors who continuously perfect the Handbook

Buy & Properly Install Super-Efficient RAC With low GWP R-32 or R-290 Refrigerant

1. Reject the dumping of inefficient RACs with obsolete R-22 and R-410A
2. Select the R-32 or R-290 RAC with the highest life cycle energy performance (LCCP) for the specific location and cooling load and considering private life cycle savings and public benefits: R-290 for small cooling loads; R-32 for larger cooling loads
3. Consider value-added features not accounted for in energy performance certification such as occupancy sensors, automatic cool air flow to the occupied portion of the room space, and self-cleaning filters and heat exchangers
4. Require installation using the best practices from the Handbook
5. Carefully observe the installation and inspect the completed install

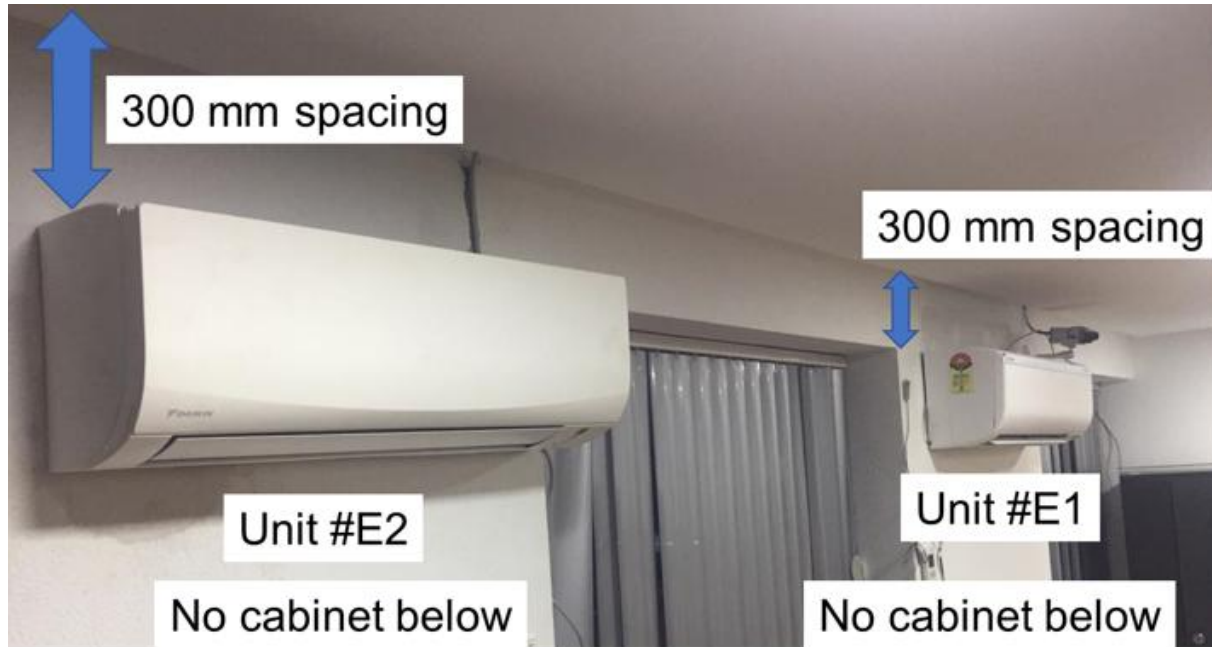
Outdoor Unit Lowest RAC Carbon Footprint and Lowest Electricity Cost

1. Place the outdoor unit where shaded in summer and sunny in winter and to keep the refrigerant lines as short as possible
2. Mount for unobstructed air intake and discharge, and not stacked or clustered near other RAC outdoor units or other heat sources
3. Use proper sized un-spliced refrigerant lines; with wide-radius curves using tube bender; brazed or properly torqued threaded fittings, and never quick connect; and insulate with R-1 or better thermal insulation from fitting to fitting
4. Evacuate the refrigerant lines and check for leaks with pressure, vacuum, and test gas before precisely charging by weight as prescribed by the manufacturer – then double check for refrigerant leaks with a precision electronic detector

Indoor Unit Lowest Carbon Footprint and Lowest Electricity Cost

1. Locate the indoor unit for unobstructed air intake on top and unobstructed air distribution throughout the room
2. Keep furnishings away from airflow
3. Install an aftermarket occupancy sensor if not an included feature of the RAC

IDU (Indoor Unit) & ODU (Outdoor Unit) Installed with Best Practice



(a) IDUs with good spacing



(b) ODUs with good spacing

Please Help Perfect the Handbook 2nd Edition Including Many Embellishments

- Draft simple contract to require best practices as outlined in Handbook
- Brochure endorsed by trusted organizations making the case for efficiency and low-GWP refrigerants
- Elaboration of each best practice
- Simplified LCCP adjusted for local circumstances including hour-by-hour carbon intensity of electricity
- Appendix of suggested training and tools for MLF finance
- Consideration of R-454B refrigerant (68.9% R-32, 31.1% R-1234yf)
(also known as Opteon™ XL41 or Solstice™ 454B)

USA Technicians Certification

United State Environmental Protection Agency

Certification of Service Technicians

- Section 608 of the USA Clean Air Act (CAA) requires that technicians who maintain, service, repair, or dispose of cooling equipment with ODS or HFC refrigerants must be certified
- Technicians are required to pass an EPA-approved test administered by an EPA-approved certifying organization to earn Section 608 Technician Certification
- Four test categories: Type I) small appliances, Type II) very high-pressure except small appliances and MACs, Type III) low-pressure, Type IV) high-pressure, low-pressure, and small appliances – “universal certification”

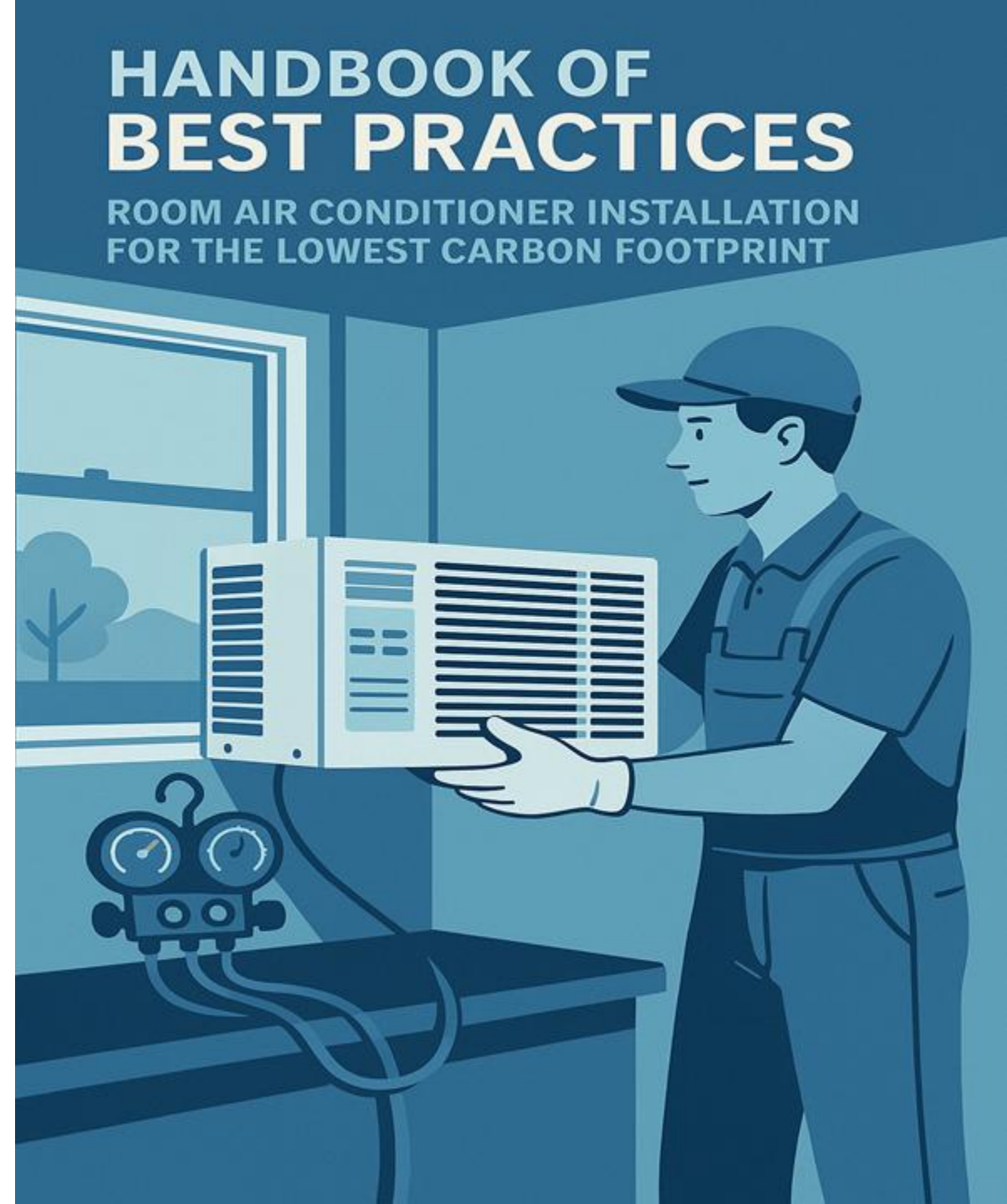
US EPA Section 608

- Violation
 - Cylinder disposal w/o refrigerant recovery
 - Failing to recover ODSs and HFCs
 - False or inadequate service records
 - Neglecting refrigerant evacuation
 - Venting ODS or HFC refrigerants
- Penalty
 - Up to US \$27,500 per day per violation plus up to US \$10,000 bounty paid to citizens reporting the violation
 - Loss of certification and criminal enforcement

US EPA CAA Section 608 Testing

- Communicating to customers the importance of refrigerant recovery and leak prevention
- EPA CAA provisions
- Lubricants and Contaminants
- Ozone Layer Knowledge
- Environmental Impact, including refrigerant atmospheric fate
- Personal Safety in Service Refrigerant Blends
- Refrigerant Nomenclature
- Refrigerant Safety and Toxicity
- Service Best Practice
- State and Local Regulations
- Technical Vocabulary
- Tools and Tool Maintenance

Thank you for your attention
Stephen O. Andersen (IGSD)





European Experience in CERTIFICATION OF RAC TECHNICIANS

Marco Buoni
Centro Studi Galileo *Director*
AREA *Former President*
w/ international affairs mandate

9th July 2025
OEWG



About AREA



Established in 1989

25 national associations

23 countries

13,000 companies

110,000 people

€23bn annual turnover



Contractors are the essential link between end users and manufacturers. They design, install and maintain RACHP equipment using every available solution with complete neutrality towards equipment and refrigerants, in the sole aim of ensuring the highest level of reliability, energy efficiency and cost-effectiveness.



Kigali Amendment

Could Europe lead the way?

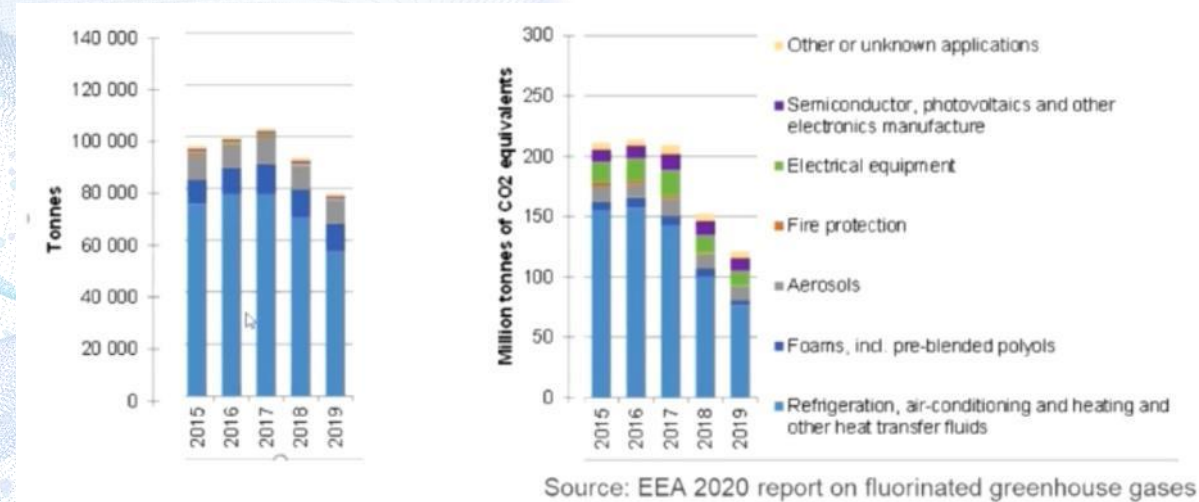
- For phase down
- For using alternative refrigerants
- For using not refillable cylinders
- Leak Checks and Periodical inspections
- Training and certification schemes – training equipment
- Register, Record Keeping, online database

In place
in EU since 2006!

Training for “Kigali”

Fgas Regulation and the Certification is working (380.000 certified technicians in EU):

- less leaks, more controls on the system, periodical inspections
- more competence, skilled personnel and companies
- better equipped, calibration, recovery, reuse, reclaimed refrigerant
- lower quantities of high GWP refrigerants in the market
- higher quantities of alternative refrigerants (mainly flammables)



Official Training Provider



With contribution of
the LIFE programme
of the European Union

**We need a certification on top of
what we have, which is working
Real Alternatives**



EU F-gas Regulation 2024/573



• Art 10 Certification and training

- ☐ **Mandatory certification** or training attestation for personnel (technicians) on F-gas and alternatives natural refrigerants in installation, maintenance, repair.... (even if uses natural refs only)
- ☐ Mandatory certification of undertakings for carrying out the installation, servicing, maintenance, repair or decommissioning of the equipment listed in Article 5(2), (a) to (e) and in Article 5(2a), (a) and (b) involving F-gases and relevant alternatives to F-gases.
- ☐ Minimum requirements skills for technicians to obtain the certification programmes and training attestation.
- ☐ Mandatory refreshment training course or certification **at least every 7 years** for natural persons.
- ☐ **Certificates and training attestations recognised in all MSs.**



F-Gas Certification curriculum

		Certificate					
SKILLS AND KNOWLEDGE		A1	A2	B	C	D	E
1	Legislation and basic thermodynamics						
1.00	Basic understanding of the applicable EU and national legislation, in particular F-gas, WEEE and Ecodesign	T	T	T	T	T	T
1.01	Knowledge of the basic ISO standard units for temperature, pressure, mass, density and energy	T	T	T	T	T	T
1.02	Understanding of basic theory of refrigeration systems: basic thermodynamics (key terms, parameters and processes such as Superheat, High Side, Heat of Compression, Enthalpy, Refrigeration Effect, Low Side, Sub-cooling), properties and thermodynamic transformations of refrigerants, including identification of zeotropic blends and fluid states	T	T	T	T	T	—

- **set of minimum competence requirements (2215/24, Implementing Regulation Annex I)**
- Certificate A1&A2,B,C,D,E: HFCs and flammable large, HFCs & flammable small, CO2, Ammonia.....
- based on state-of-the-art standards EN 13313 and ISO 22712

Contains: (a) applicable regulations and technical standards;

(b) emission prevention;

(c) recovery of fluorinated greenhouse gases listed in Annex I and in Section 1 of Annex II;

(d) safe handling of equipment of the type and size covered by the certificate;

(e) safe handling of equipment containing flammable or toxic gases or operating under high-pressure or involving other relevant risks;

(f) the measures for improving or maintaining the energy efficiency of equipment during installation, or maintenance or servicing.

F-gas certified personnel by country (2023)

Austria	1,321
Belgium	2,563
Croatia	1,906
Czech Republic	550
Denmark	2,767
Estonia	N/A
Finland	4,995
France	20,000
Germany (1)	3,500
Greece	120
Ireland	817
Italy	43,786
Netherlands	2,000
Poland	13,557
Portugal	2,200
Slovakia	1,979
Spain	19,100
Sweden	1,745
Total EU	122,906
Norway	1,359
Turkey	26
Total non-EU	1,385
Grand total	124,291

Companies

Austria	3,970
Belgium	9,742
Croatia	2,434
Czech Republic	7,126
Denmark	5,944
Estonia	430
Finland	11,220
France	50,000
Germany	63,900
Greece	10,600
Ireland	4,800
Italy	79,281
Netherlands	3,200
Poland	43,245
Portugal	6,536
Slovakia	1,728
Spain	56,000
Sweden	8,716
Total EU	368,872
Norway	4,037
Turkey	5,000
Total non-EU	9,037
Grand total	377,909

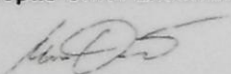
Personnel

UK 52.300 (in 2021)



Legislation And Monitoring System

- Badge
- Online public list of certified technicians and companies
- Online logbook with interventions, repairs, installations (census)


CEPAS
Cepas S.r.l. declares that
HOUSSEM xxxxxxxxxx
xxxxxxxxxxxxxxxxxxxx
Born on **29/06/1981** in |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx|
Is certified in accordance with Regulation (CE) 303/2008 as operator of stationary refrigeration, air-conditioning and heat pump equipment containing certain fluorinated greenhouse gases, category I.
Massimo Dutto
Cepas Chief Executive


Issued date: 21/03/2018
Expiration date: 20/03/2028

This certificate will be valid in European Union after registration to the Italian National Telematic Register, according to DPR n.43/2012. For more information, please contact Cepas srl.
Legend:

Activities	Cat. I	Cat. II	Cat. III	Cat. IV
Leak check	YES	Any system(without breaking into the circuit above 3kg)	NO	Yes, without breaking into the circuit
Recovery	YES	<3kg gas(<6kg for her metical sealed systems)	<3kg gas(<6kg for her metical sealed systems)	NO
Installation	YES	<3kg gas(<6kg for her metical sealed systems)	NO	NO
Maintenance and repair	YES	<3kg gas(<6kg for her metical sealed systems)	NO	NO

Different equipment with low GWP refrigerants

The use of flammable gases in the equipment will be subject to the implementation of some risk mitigation measures such as, among other things: the introduction of shut-off valves, pump down to the outdoor unit, pressure switches, continuous ventilation or additional regulated by leak detector on board the machine, ATEX certified electronics. All this can make us understand how the initial cost of the appliance, installation, but also maintenance/repair, of a small domestic air conditioner can increase considerably.

In addition to the inevitable increase in costs for the equipment, it is useful to remember that the individual companies involved in the installation, maintenance and repair of these appliances must face considerable investments to equip themselves with tools and equipment suitable for flammable gases.



Service procedure differences

Need to carry out or refer to a RISK ASSESSMENT and taking into account control measures prior to carrying out any work.

- The properties of the alternative refrigerants, and in particular their hazards, affect how systems are serviced and maintained

Remember
If you are unsure of anything:
Do Not Proceed.
Stop work and ask the question!



Suitable gloves and safety glasses should be worn when working with any refrigerant, and when carrying out hot works (brazing / welding). Antistatic wrist strap should also be worn



Refrig.	Work area	Equipment	Leak testing	Charging	Recovery / disposal
R744	Very well ventilated	Suitable for the very high pressure	Method must be sensitive to R744	Initial charge should be gas to prevent dry ice formation	Venting is the usual practice
R717	<u>Very well ventilated and free from sources of ignition</u>	Suitable for use with R717 and free from sources of ignition	Method must be safe and sensitive to R717		Recovered
R32		Suitable for the high pressure and free from sources of ignition	Method must be safe and sensitive to R32		<u>Recovered</u>
R1234ze		<u>Free from sources of ignition</u>	Method must be safe and sensitive to R1234ze		Recovered
R600a			<u>Method must be safe and sensitive to HCs</u>	<u>Charge weight is less so accuracy important</u>	<u>Small amounts* can be vented, otherwise HC is recovered</u>
R290					
R1270					

Maintenance and Repair

*Small amounts are usually considered to be less than 150g.

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Training Manual: Refrigerants Servicing and Best Practices

Access to the "UNEP - AREA Training Manual: Refrigerants Servicing and Best Practices" is restricted to training providers authorized by their respective National Ozone Units.

You must be logged in and authorized for access before you can download modules or courses. You may view module descriptions and contents prior to requesting authorization.

Downloads can be made of individual modules or as pre-packaged courses consisting of multiple modules. Each download provides materials for a complete learning experience, including text, syllabus, instructor PowerPoints, attendee pre-assessment and final test, trainer qualifications, venue requirements, equipment needed, and generic certificate.

Approved for educational use only. The manual may not be used by companies nor other entities for commercial purposes. The manual's Terms of Use do not allow for the sharing of training packages except for use in UNEP authorized training.

REAL Alternatives

blended learning for low GWP refrigerants



www.realalternatives.eu

- **Flammables** (HCs - HFOs - low GWP blends), **CO₂**, **Ammonia**
- **9 Modules**
- **Free learning material** available for download
- **Multi-lingual** programme (18 languages – 21 EU or 25 tot countries)
- **Licensed training providers (around 30) in each country:**
 - **Best Practices** in fully equipped laboratories, focusing on the safety issues
 - **Theory** in classroom or remote
- **Certification (theory and practice)** consistent and recognized among project members (more than 3000 certificates so far)



Instructions on how to organise a course & certification

→ New partners, Training providers or just learners in our training centres are welcome!

Shortage of skilled workforce / 3rd Women in cooling Competition 2025

• Competition Themes

The subjects of the video are one or both of the following:

Design and application of RACHP systems Handling of a refrigeration, air conditioning or heat pump system

• Evaluation criteria The evaluation criteria are:

- The use of the necessary devices and tools
- The use of security means
- The correct explanation of the task to be performed

• The winner obtain a **Prize and an amount of 1000 euros** which will be awarded to the winner in UNEP-IIR-AREA-ATF conference by World Refrigeration Day secretariat and the AREA President. AREA, through ATF, will sponsor flight, accommodation, dinner and participation to the AREA general assembly.

The name of the winner will be officially announced in May'25 during the AREA general assembly in Istanbul.



WOMEN IN COOLING

2025 EUROPEAN VIDEO COMPETITION

❄ RECORD A VIDEO SHOWING BEST PRACTICES IN THE DESIGN AND APPLICATION OF RACHP SYSTEMS AND/OR HANDLING OF REFRIGERATION, AIR CONDITIONING OR HEAT PUMPS.

❄ UPLOAD YOUR VIDEO ON "AREA RACHP" FACEBOOK PAGE OR SEND TO INFO@AREA-EUR.BE.

DEADLINE: 7 MAY 2025
ALL EUROPEAN LANGUAGES WELCOME



**THE WINNER
WILL BE AWARDED:**

❄ BY AREA (THROUGH ATF) OF FLIGHT, ACCOMMODATION AND CONFERENCE FEE.

❄ RECEIVE A CHEQUE OF 1,000 EUROS FROM WORLD REFRIGERATION DAY.

❄ RECIVE THE PRIZE IN THE FRAME OF UNEP-IIR-AREA-CSG 21TH EUROPEAN CONFERENCE MILAN, 12-13 JUNE 2025.

CHARLOTTE ROBINSON
FROM THE UK WINS
THE SECOND EDITION (2024)

FIND OUT MORE AT
WWW.AREA.BE OR CONTACT
INFO@AREA-EUR.BE

How we can assist?

- Help on writing the legislation
- Support on the way to “Kigali”, following EU example, adapting to the country. Each country is different.
- Adopting Training, Certification and implementing schemes
- Assessing training centres, venues, Tools and Equipment
- Organising Training, Certification sessions

All the above should be implemented together for success



Stronger together

***Thank you
Marco Buoni***

Email: buoni@centrogalileo.it



*"For a clean,
decarbonised
and sustainable
heating and
cooling sector"*

AREAVISION2030



Technician's training and certification in Refrigeration and AC sectors in China

**Tsinghua University
China Refrigeration Association**

**Baolong WANG
2025.7**

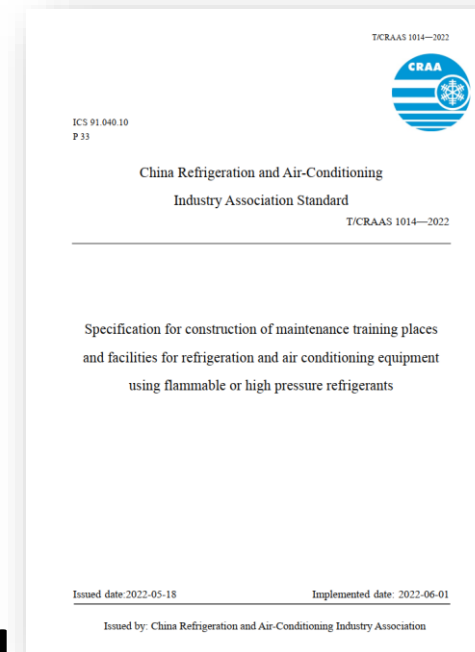
Basic law, standards and specification

- **Work Safety Law of the People's Republic of China (Revised 2025)**
 - Provides legal regulations related to safety production, including the operation personnel for refrigeration and air conditioning maintenance.
- **National Occupational Skill Standards**
 - Providing detailed skill requirements for various professions, including refrigeration technicians, cold storage workers, and air conditioning technicians



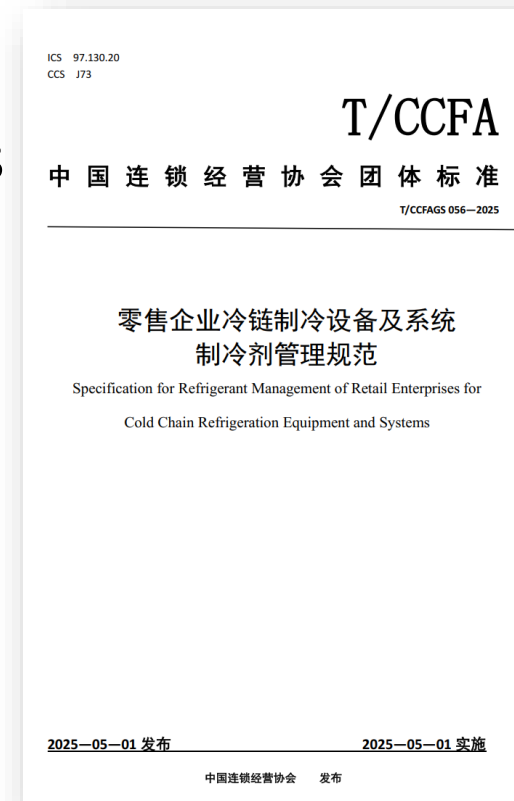
Basic law, standards and specification

- **T/CRAAS 1014-2022** *Specification for construction of maintenance training places and facilities for refrigeration and air conditioning equipment using flammable or high-pressure refrigerants*
 - **Layout of the training station, the ventilation of the training room, precautions for operating major facilities**
 - **Theoretical and practical requirements for teaching staff and training room management personnel**



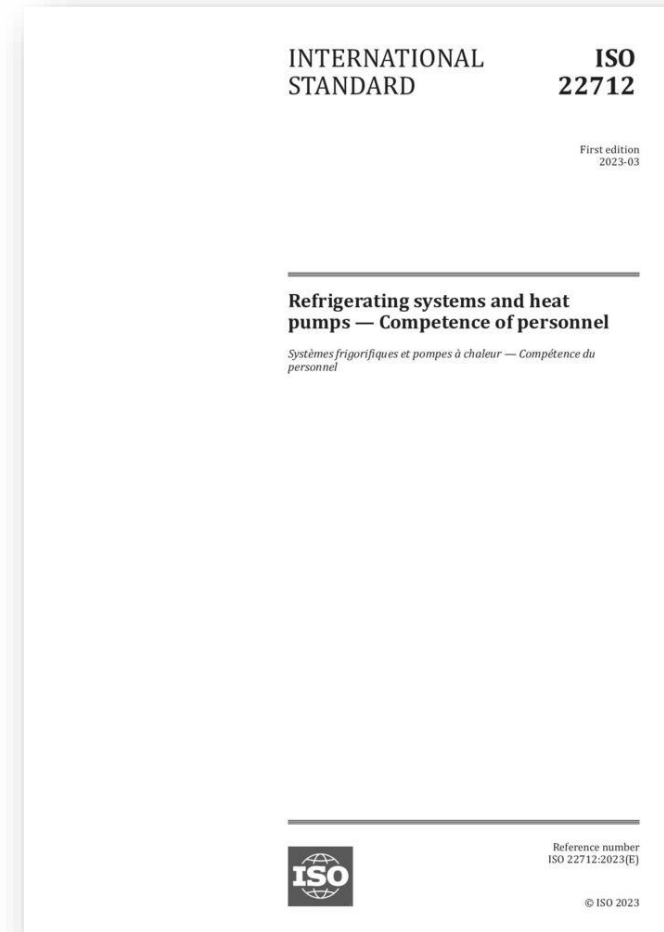
Basic law, standards and specification

- **T/CCFAGS 056-2025** *Specification for Refrigerant Management of Retail Enterprises for Cold Chain Refrigeration Equipment and Systems*
 - Specifies the requirements for use and management of all types of refrigerants in the installation, operation, maintenance, repair, and disposal of cold chain refrigeration equipment in retail enterprises
 - Applicable to retail stores such as supermarkets, convenience stores, and food specialty stores



Basic law, standards and specification

- **20243544-T-604 (National standard under revision):**
Refrigerating systems and heat pumps – Competence of personnel
 - Modified adoption of **ISO 22712:2023**
 - Provides a comprehensive set of guidelines about the training competencies for different personnel working on RACHP systems at different stages of the product lifecycle



Core requirements of training

- **Knowledge Framework**

- **Theoretical Foundation:** Thermodynamics, Heat Transfer, Fluid Mechanics, and Electrical Principles
- **Professional Content:** Principles of Refrigeration Cycles (Vapor Compression/Absorption), Equipment Structure (Compressors, Condensers, etc.), Control Systems

Core requirements of training

- **Practical Skills**

- **Installation and Maintenance:** Pipe Welding, System Vacuuming, Refrigerant Charging and Recovery
- **Testing and Debugging:** Using Multimeters, Pressure Gauges, Leak Detectors, and Other Tools for System Performance Testing
- **Emergency Response:** Firefighting, Ammonia Leak Emergency Handling, Personnel Rescue

Core requirements of training

- **Safety and Compliance**

- **Mandatory Requirements:** Possession of Special Operation Certificates (Reviewed Every 3 Years), Familiarity with the "Work Safety Law" and "Special Equipment Safety Supervision Regulations"
- **High-Risk Operation Standards:** Protective Measures for Working at Heights, Electrical Welding, and Refrigerant Storage

Mandatory Certification

Component	Content
Theory Exam	Safety regulations, thermodynamics, system principles (multiple-choice questions)
Practical Exam	Fault diagnosis (e.g., liquid slugging), compressor maintenance, leak detection
Re-certification	Every 3 years (8-hour training on new technologies e.g., CO ₂ refrigeration)

Thanks

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Certification Scheme

Case study: Tunisia

Wednesday 9th, 2025

Youssef HAMMAMI, NOU Tunisia

History of the establishment of the certification system in Tunisia

- Tunisia started the implementation of the certification scheme since 2016,
- The strategy adopted is to strengthen the capacity of vocational training centers and RAC trainers,
- 11 vocational training centers have been equipped with training equipment and tools (refrigerants recovery machines, digital leak detectors, manifolds, etc.)

With support UNIDO (HPMP _ Phase I & II)

- Development of a certification training manual (7 modules):
2018

- Development of a training module on Natural and flammables refrigerants : 2021
- Development of logbook for RAC installations (2024)



- Total number of vocational training centers in the RAC sector: **40**
- **141 RAC trainers** have been certified according to European regulation EU 2067/2015 , cat I
- Certification training center: Centro Studi Galileo (Italy)



Certification scheme

For category I:

- **1 day:** theoretical part



For category I:

- 1 day: practical part



- 1 day: Exam (theoretical & practical part)
- Certification category: **cat I**
- Certification validation: **10 years**



Closing of the certification session



National regulation

- National Regulation is similar to the EU Regulation (certification validation 7 years, 1 module on natural & flammable refrigerant)
- Elaborated in 2023 (by NOU Tunisia)
- Approved by Ministry of Environment: 2024
- Under approval by Prime Minister (government): 2025

Thank you

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Thank you for your participation!

