



European experience with certification schemes for servicing technicians

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AREA

The indisputable voice of European RACHP contractors



- Funded in 1988 in Brussels, Belgium
- Represents RACHP contractors
- AREA in figures:
 - 20 national member associations
 - 18 countries from EU and beyond
 - > 9,000 companies (mainly SMEs)
 - +/- 125,000 work force
 - +/- € 20 bn annual turnover



Design, installation, maintenance and repair of all **Refrigeration, Air Conditioning and Heat Pumps** RACHP systems

AREA Priorities



General mission statement

"support and initiate activities to promote the industry and its high standards of quality, in order to serve users' interest in a safe and uninterrupted usage of efficient refrigeration, air conditioning and heat pump equipment, and to create and maintain a favourable business climate for European refrigeration, air conditioning and heat pump contractors, in terms of quality, safety, employment, fair competition and profitability".

General objectives

Harmonisation of education & training / certification

Promotion of technical evolutions

Environmental protection / tackling climate change / energy efficiency

Recommendations on and promotion of professional techniques & high-level standards

Key issues

Regulatory aspects

- F-Gas Regulation implementation and review
- Monitoring of Ozone Depleting Substances
- Energy efficiency - Climate change
- Eco-design of energy-related products

Professional standards

- Heat pump installation
- F-gas certification and education

Professional guidance

- Low GWP refrigerants, certification and education



To prevent HFCs emissions In Europe:

→ F-gas regulation and certification

REGULATION (EC) 842/2006

In synthesis the Refrigeration, Air Conditioning and Heat Pumps systems with HFCs should have:

- Logbook
- Periodical inspections
- Installation, repair only by certified craftsmen

Mandatory Certification to handle HFCs



Who needs to be certified? (1)

Natural persons (personnel) carrying out certain tasks on certain types of equipment **must be certified or qualified.**

Equipment

Stationary refrigeration, air conditioning, heat pump and fire protection equipment

Refrigerated trucks (above 3.5 t) and trailers

Air conditioning equipment in road vehicles within the scope of Directive 2006/40/EC on mobile air conditioning (recovery operations only)

Air conditioning equipment in road vehicles outside the scope of Directive 2006/40/EC on mobile air conditioning (recovery operations only)

Member States can adopt further certification and training programmes on other types of equipment.

Tasks

Installation, servicing, maintenance

Repair

Decommissioning

Leakage checking

Recovery

1. *For task a) to e) On stationary equipment and on refrigerated trucks and trailers, personnel must be certified*
2. *For task e) On air conditioning equipment in road vehicles within the scope of Directive 2006/40/EC on mobile air conditioning, personnel must be appropriately qualified, i.e. hold at least a training attestation. Member States must ensure that training programmes are available.*
3. *For task e) On air conditioning equipment in road vehicles outside the scope of Directive 2006/40/EC on mobile air conditioning, personnel must be appropriately qualified, as above.*



Who needs to be certified? (2)

Undertakings (normally the companies) carrying out certain tasks on certain types of equipment for other parties **must be certified**.

Equipment

Stationary refrigeration, air conditioning, heat pump and fire protection equipment

Member States can adopt further certification and training programmes on other types of equipment.

Tasks

Installation, servicing, maintenance

Repair


















Decommissioning

Companies should fulfil the following requirements


- (a) employment of personnel certified in accordance with Article 5, for the activities requiring certification, in a sufficient number to cover the expected volume of activities;
- (b) proof that the necessary tools and procedures are available to the personnel engaged in activities for which certification is required.

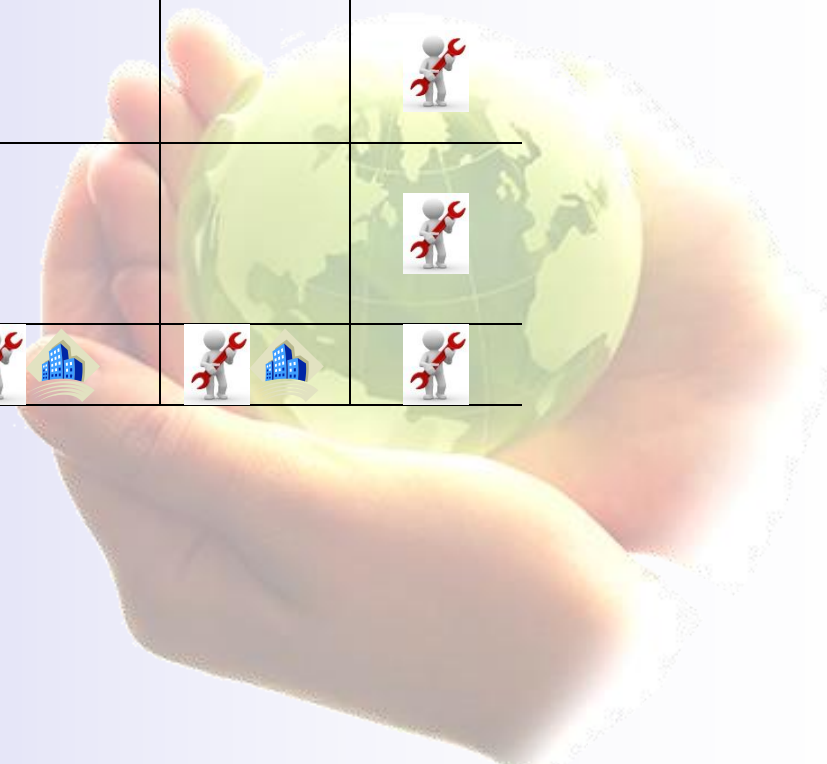


Summary of certification

	Installation, servicing, maintenance	Repair	Decommissioning	Leakage checking	Recovery
Stationary RACHP equipment					
Refrigerated trucks & trailers					
A/C in road vehicles Directive 2006/40					
A/C in road vehicles Outside Directive 2006/40					
Stationary fire equipment					

 Company

 Natural person



REGULATION (EC) 303/2008



MINIMUM COMPETENCE OF PERSONNEL

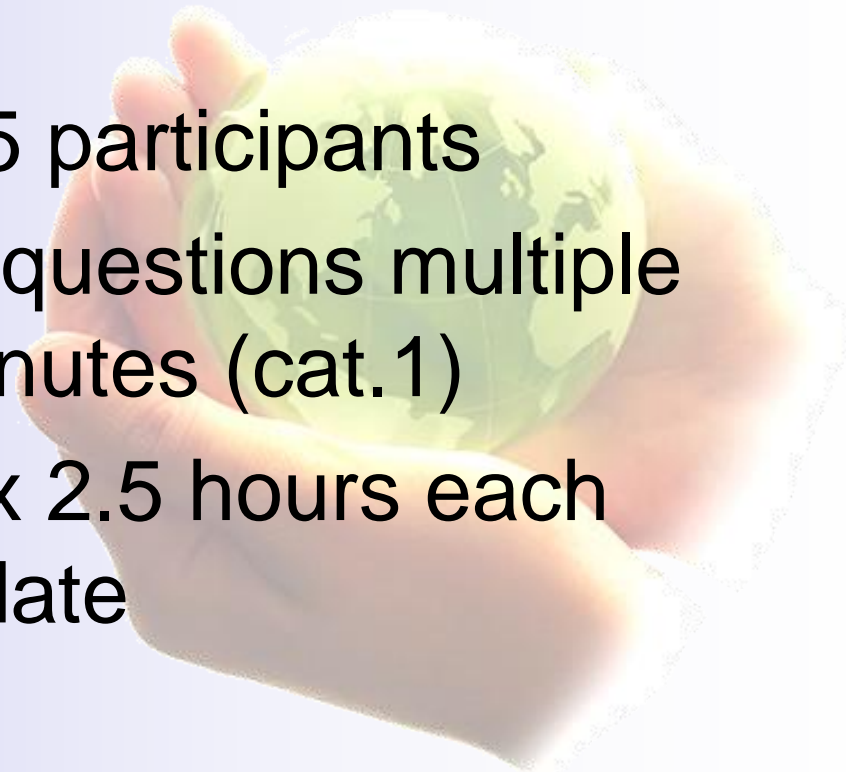
DUTIES AND KNOWLEDGE		CATEGORIES			
		I	II	III	IV
1	Basic thermodynamics	T	T		T
2	Environmental impact of refrigerants and corresponding environmental regulations	T	T	T	T
3	Checks before putting in operation, after a long period of non-use, after maintenance or repair intervention, or during operation	P	P		
4	Checks for leakage	T/P	T/P		T/P
5	Environment-friendly handling of the system and refrigerant during installation, maintenance, servicing or recovery	P	P	P	
6	Component: installation, putting into operation and maintenance of reciprocating, screw and scroll compressors, single and two-stage	P	P		
7	Component: installation, putting into operation and maintenance of air cooled and water cooled condensers	P			
8	Component: installation, putting into operation and maintenance of air cooled and water cooled evaporators	P			
9	Component: installation, putting into operation and servicing of Thermostatic Expansion Valves (TEV) and other components	P			
10	Piping: building a leak tight piping system in a refrigeration installation	P	P		

Certification of technicians in servicing sector how it runs (1)



Italian Certification scheme

- 1 day with max 15 participants
- Theoretical exam 30 questions multiple choice in 90 minutes (cat.1)
- Practical exam max 2.5 hours each candidate



Certification of technicians in servicing sector how it runs (2)



Theoretical Exam

60% correct to pass



Probably the More difficult part of the exam



Certification of technicians in servicing sector how it runs (3)



Practical Exam

In max 2,5 hours:

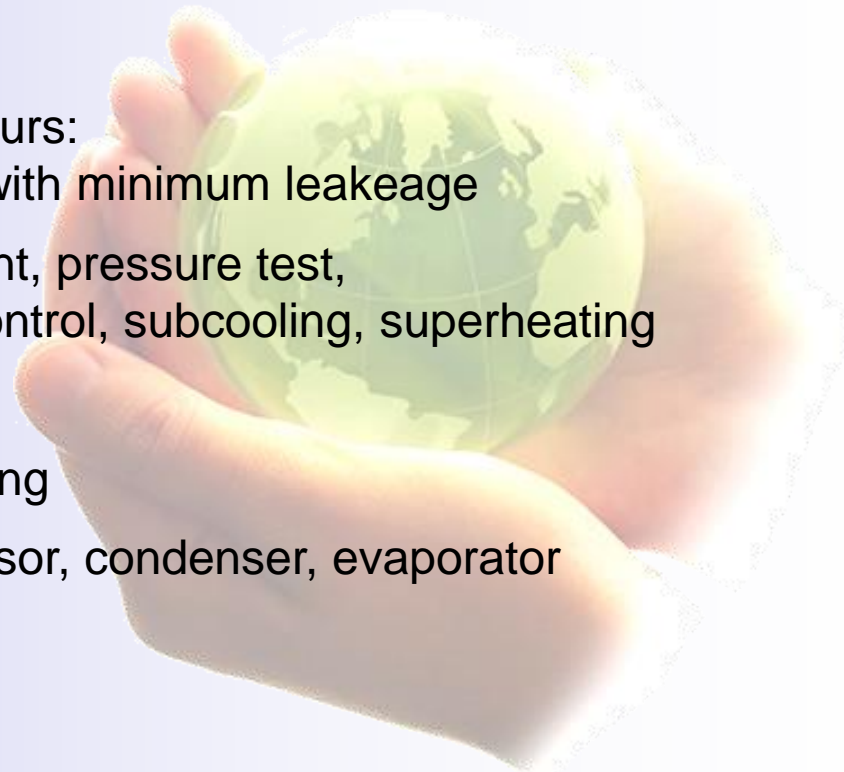
Charge, Vacuum, Recovery with minimum leakage

Leak Check with equipment, pressure test,
Parameters temperature, Pressure control, subcooling, superheating

Brazing

LogBook filling

Simulation of installation of compressor, condenser, evaporator



Certification of technicians in servicing sector how it runs (4)



Brazing



Temperature, Pressure, Subcooling, Superheating



Vacuum, Charge, Recovery



Technology and knowledge Training, Assessment (1)



Strengthening national refrigeration & air-conditioning (RAC) associations in Eastern European & Central Asian countries

27 November 2012 – Casale Monferrato: The Italian Centro Studi Galileo, the European Association of Refrigeration, Air-conditioning and Heat Pump Contractors (AREA) and the United Nations Environment Programme (UNEP) joined forces to strengthen national refrigeration & air-conditioning (RAC) associations in Eastern European and Central Asian countries.



Technology and knowledge Training, Assessment (2)



Representatives of national RAC associations participate since 2009 in the meetings of the Regional Ozone Network for Europe & Central Asia (ECA network) and they play a crucial role in implementing the national HCFC phase-out management plan. The meeting focused on those countries with relatively young RAC associations and those which are planning to establish such associations in the near future. So far, the ECA network supported the creation of national RAC associations in Bosnia & Herzegovina, Croatia, and Macedonia FYR.



All participants successfully passed the theoretical and practical assessment and were certified under the F-gas regulation. This certification is mandatory in the member countries of the European Union and will shortly become mandatory in accession countries like Croatia.





Technology and knowledge Training, Assessment (3)

Training for Ghana on natural refrigerants: Hydrocarbons HC

a delegation of technicians from Ghana received theoretical and practical training on the safe handling and design of equipment with hydrocarbon refrigerants at the headquarters of the Centro Studi Galileo, Casale Monferrato, Italy. The training is in line with the country's efforts to phase out HCFCs and establish a safe hydrocarbon and natural refrigerant use culture





Contractors' training with low GWP refrigerants: mind the gap!

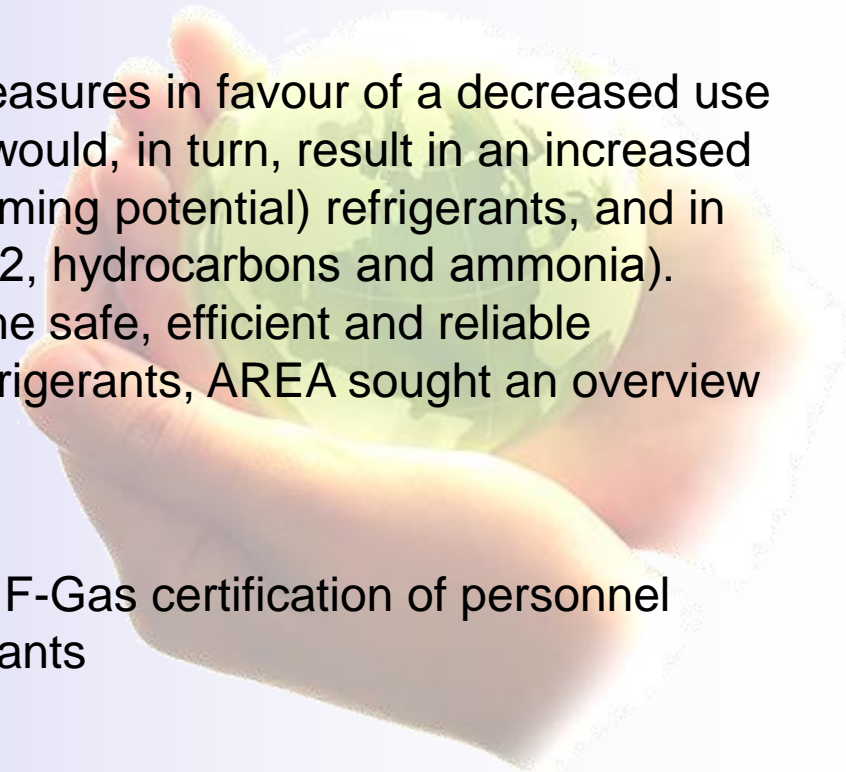
The use of HFCs is legislatively decreased and consequently the use of natural refrigerants is pushed, there will be a gap between training offer and training needs resulting in a shortage of trained contractors



The revision of the F-Gas Regulation include measures in favour of a decreased use of HFCs in RACHP equipment. Such measures would, in turn, result in an increased use of alternatives, namely low GWP (global warming potential) refrigerants, and in particular the so-called “natural refrigerants” (CO₂, hydrocarbons and ammonia). Mindful of the key role played by contractors in the safe, efficient and reliable functioning of equipment working with natural refrigerants, AREA sought an overview of the availability and level of training in the EU.



Solution could be starting from the F-Gas certification of personnel adding modules for natural refrigerants




EU Fgas Revision: Low GWP refrigerants Certification and Trainings

The final text approved by both the European Parliament and the Council of the European Union has eliminated the points relating to certification in alternative refrigerants, which will take the place of the phased down ones, and this has happened because politicians felt that it was not a factor inherent to the subject of the same regulation that refers only to fluorinated greenhouse gases

the failure to include the section on mandatory certification of alternative refrigerants – namely flammable refrigerants, hydrocarbons, toxic refrigerants such as ammonia, high pressure refrigerants, such as carbon dioxide, or the brand new mildly flammable synthetic refrigerants HFO - could cause a shortage of trained and competent technicians, potentially increasing the risk of accidents which could lead to a negative shadow being cast on both the success of the regulation itself and on the trust within the entire industry. This would threaten to block the RAC market with significant damage throughout the industry, from the manufacturers to end-users such as large retailers, supermarkets and the product's brand

Each European Association of the 28 members must loudly propose to their own governments, the extension of the certification of refrigeration technicians that use fluorinated refrigerants including specific modules on the use of alternative refrigerants. AREA has already prepared a scheme to propose this to the member states



the market will drive towards competence
and so certification and training for LOW
GWP refrigerants will be implemented



EU Fgas Revision: Low GWP refrigerants Certification and Trainings (2)

Certification and training programmes must now include information on relevant technologies to replace or reduce the use of fluorinated greenhouse gases and their safe handling.

Certified operatives must have access to information on:

- Relevant technologies to replace or reduce the use of fluorinated greenhouse gases and their safe handling, and
- Existing regulatory requirements for working with equipment containing alternative refrigerants



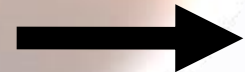
Pros / Cons refrigerants

Refrigerant	HFC	Natural			HFO
		HCs	Ammonia	CO ₂	1234yf
GWP (100 years)	XX R134a 1300 – R410A 1900	✓ 3-5	✓✓ 0	✓✓ 1	✓ 4
Toxicity	✓✓	✓✓	XX	✓	✓✓
Flammability	✓✓	XX	X	✓✓	X
Materials	✓	✓	X	✓	✓
Pressure	✓	✓	✓	XX ¹	✓
Availability	✓✓	✓	✓	✓	XX
Familiarity	✓✓	✓	✓	X	X

Very poor **XX** Poor **X** Good **✓** Very Good **✓✓**

Source: F-gas support Information Sheet - RAC7 alternatives

Every refrigerant has his own application



Some Applications of low GWP alternative refrigerants



Applications	Refrigerant
Industrial Refrigeration	HFO 1234ze (?)*
All kind of Industrial Ref.	Ammonia
Cascade systems	Carbon Dioxide + Ammonia
Secondary fluids	Carbon Dioxide
Commercial Refrigeration	HFO 1234ze*
Cabinets	Hydrocarbons
Bottle coolers	Hydrocarbons
Supermarkets	Carbon Dioxide
Domestic Refrigeration	
freezers	Hydrocarbons
Air Conditioning	R32
Heat Pumps Hot Water	Carbon Dioxide Trans-critical
Large Chillers	Ammonia
Small Monobloc Air Conditioning	Hydrocarbons
Automotive	HFO 1234yf

no refrigerant represents the ideal solution in all cases and for every equipment – each cooling application has to be looked at in its own merits and a professional choice must be made taking into account many more factors than simply GWP

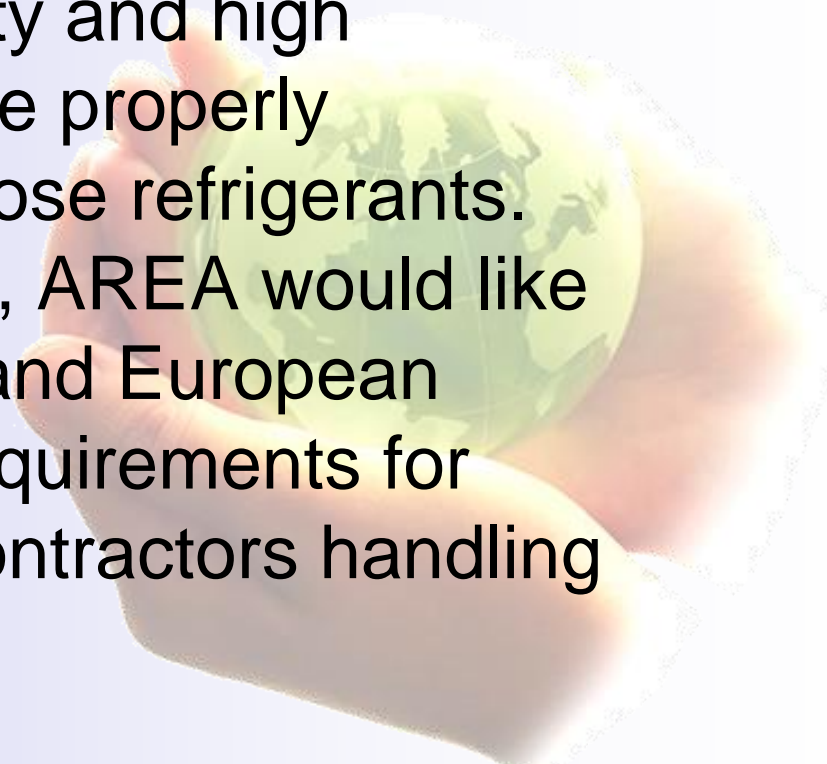


From AREA guidance on LOW GWP refrigerants

*more applications for HFOs and HFO blends will probably be developed with full commercialisation of the refrigerants

AREA position on training and certification of LOW GWP refrigerants (1)

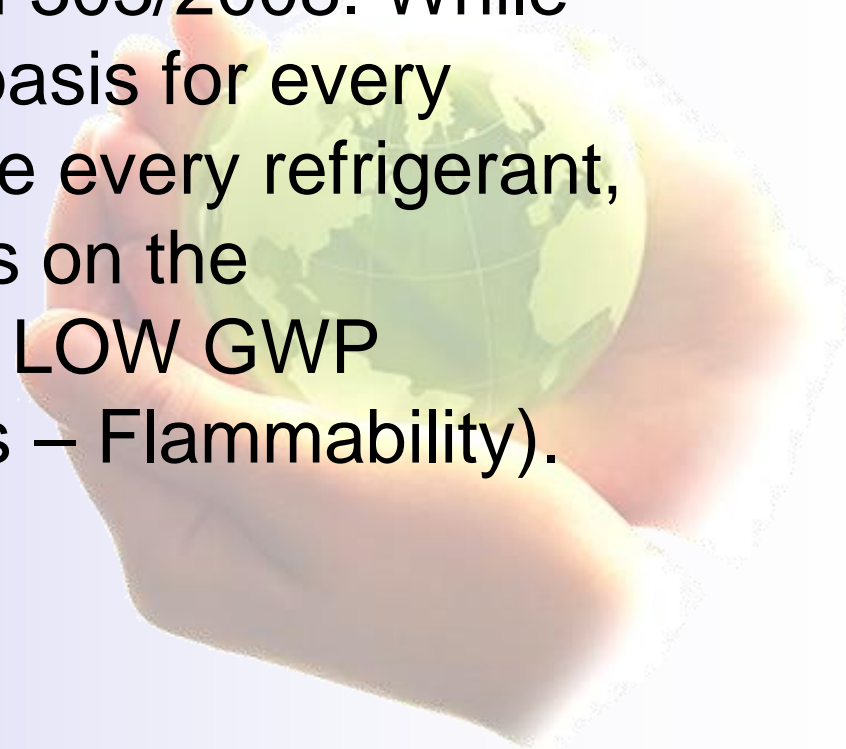
- A future phase-down of HFCs will lead to a higher use of alternative refrigerants / low GWP refrigerants. Low GWP refrigerants have issues on safety, flammability, toxicity and high pressure which will need to be properly considered when handling those refrigerants. With this guidance document, AREA would like to recommend to worldwide and European decision-makers minimum requirements for training and certification of contractors handling low GWP refrigerants.





AREA position on training and certification of LOW GWP refrigerants (2)

- It is not AREA's intention to create a new certification scheme – only to add specific modules to the existing HFCs certification scheme based on Regulation 303/2008. While HFC certification will be the basis for every contractor who want to handle every refrigerant, each added module will focus on the specificities of the respective LOW GWP refrigerant (i.e. Hydrocarbons – Flammability).



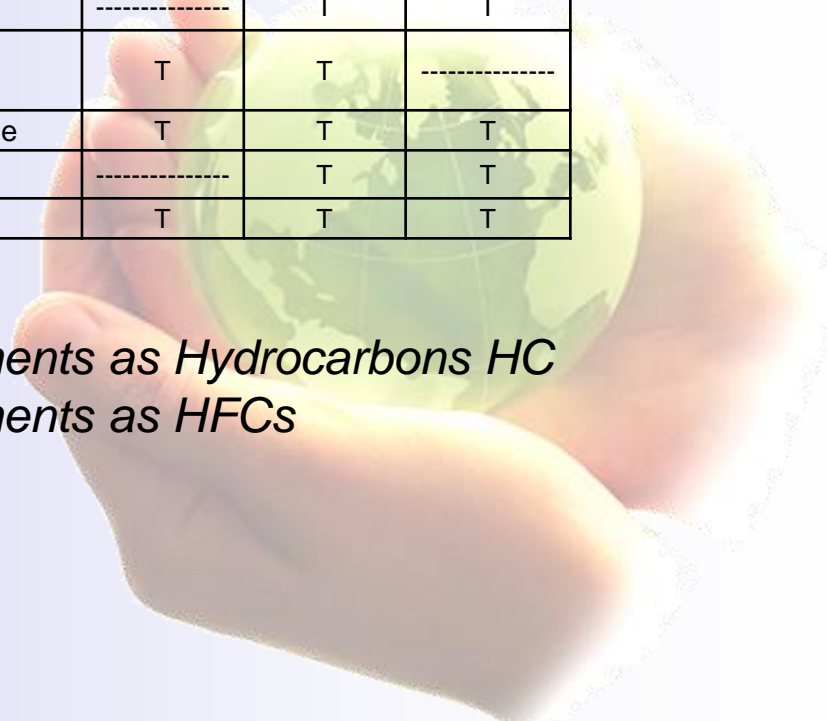
(1) Minimum Requirements listed for the Specific module HC – NH₃ – CO₂ – HFO*

	HC	NH ₃	CO ₂
BASIC THERMODYNAMICS AND PHYSICS			
Thermodynamic properties of Low GWP refrigerant: temperature, pressure, density, thermal capacity, p/h diagram	T	T	T
Differences between Low GWP refrigerants and HFCs	T	T	T
Toxicity characteristics, grades and limits for the human body	-----	T	T
Characteristic of Flammability of the substances, velocity of propagation, LFL, UFL, occupancy	T	T	-----
Specific components for that refrigerant in the refrigeration cycle	T	T	T
Material compatibility	-----	T	T
Oil compatibility, requirements and oil return	T	T	T

**HFO1234yf: same, minimum requirements as Hydrocarbons HC*

**HFO1234ze: same minimum requirements as HFCs*

R32 as Hydrocarbons HC



(2) Minimum Requirements listed for the Specific module HC – NH₃ – CO₂ – HFO*

	HC	NH ₃	CO ₂
GOOD PRACTICE			
Identify typical application of Low GWP refrigerants RAC systems ² (refer to AREA: Low GWP Refrigerants Guidance)	P	P	P
State and identify the commonly used refrigerants designation	P	P	P
State the requirements for safely labeling Low GWP refrigerant RAC systems ⁶	P	P	P
Select appropriate tools, equipment and PPE for work on Low GWP RAC systems ⁶	P	P	P
Recovery of the refrigerant	P	P	P
Venting the refrigerant in a safe way (according to national legislation)	P	P	P
Calculate the safe fill weight for the recovery cylinder (density difference between HFCs and Low GWP refrigerants) ²	P	P	P
Leak check direct assessment with the correct equipment	P	P	P
Make vacuum of the refrigerant preventing moisture in the system and without refrigerant emissions	P	P	P
Make charge of the refrigerant with no emission relief	P	P	P
Make a connection without brazing with alternative connections	P	P	P
Check the correct functioning of the safety ventilation system		P	P
Check the correct functioning of the safety system controls	P	P	P

^[1] All practical trainings should include theoretical training

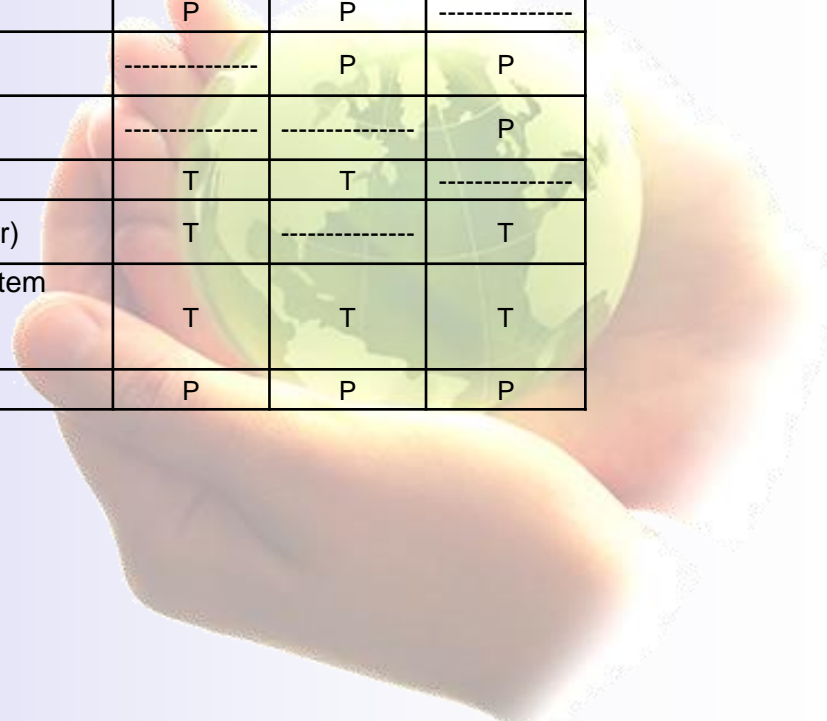
^[2] City and Guilds, Level 2 and Level 3 Refrigeration and Air Conditioning CPD Pathways, March 2012 v1.0

^[3] It is normally accepted to vent hydrocarbons with low charges (please refer to national legislation)

^[4] It is normally accepted to vent CO₂ (please refer to national legislation)

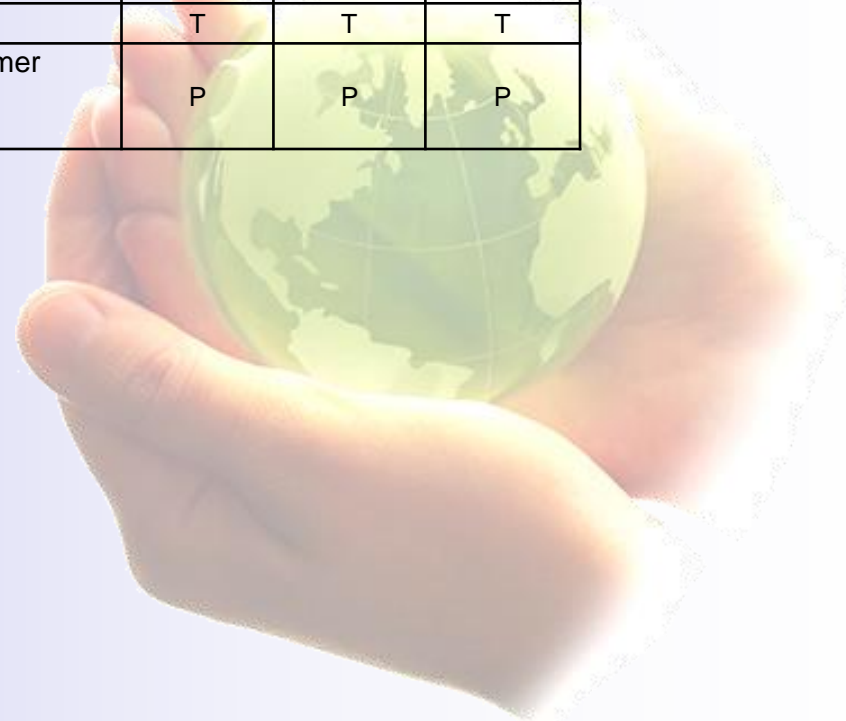
(3) Minimum Requirements listed for the Specific module HC – NH₃ – CO₂ – HFO*

	HC	NH ₃	CO ₂
HEALTH AND SAFETY REQUIREMENTS			
Safe system shutdown and isolation ²	P	P	P
Extinguish a fire, identify the appropriate fire extinguisher	P	P	-----
First aid care treatment for frostbite	P	P	P
First aid due to fire burn	P	P	-----
First aid suffocation due to breathing problems	-----	P	P
Safety issues related to high pressures	-----	-----	P
Calculate LFL (confined space)	T	T	-----
Calculate confined space for asphyxiation (heavier than air)	T	-----	T
Check that Health and Safety rules in the refrigeration system location are respected (emergency exits, fire alarms, leak detectors...)	T	T	T
Correct use of Personal Protective Equipment	P	P	P



(4) Minimum Requirements listed for the Specific module HC – NH₃ – CO₂ – HFO*

	HC	NH ₃	CO ₂
REGULATIONS AND STANDARDS			
Knowledge of European and National Regulations and standards	T	T	T
Storage of the refrigerant	T	T	T
Transport of the refrigerant	T	T	T
Describe the process for handing over system to customer completing and passing on appropriate commissioning documentation ²	P	P	P



Technology and knowledge Training, Assessment (3)

The Gambia (LVC)



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

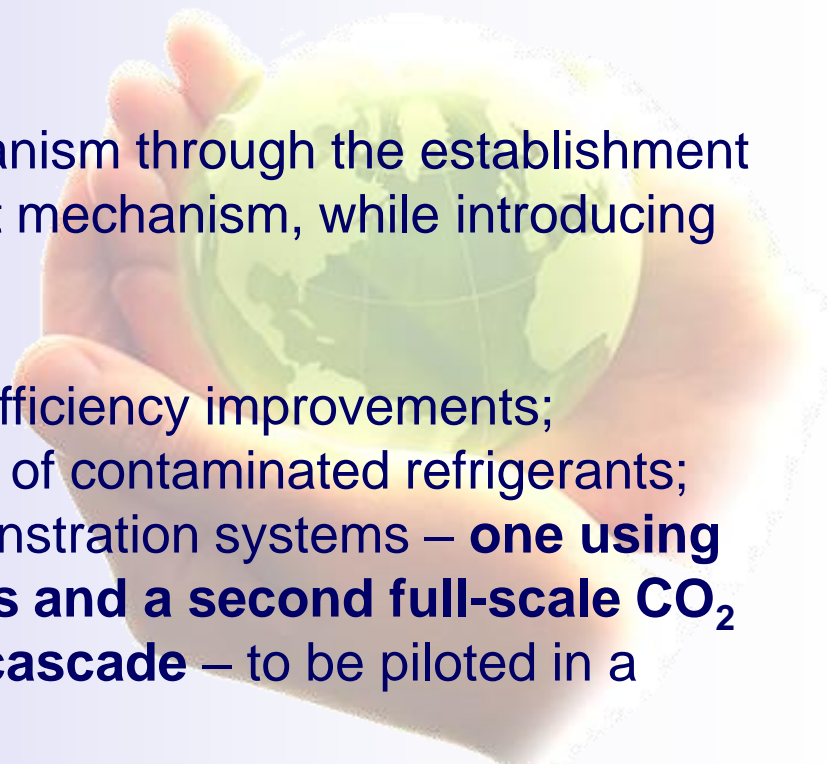
www.unido.org



Expected Outcome: Technical and financial support on replacement refrigerants, and reducing greenhouse gas emissions and operational costs, is ensured.

Aim: To pilot a technology transfer mechanism through the establishment and operation of the technical support mechanism, while introducing innovative technologies to this sector.

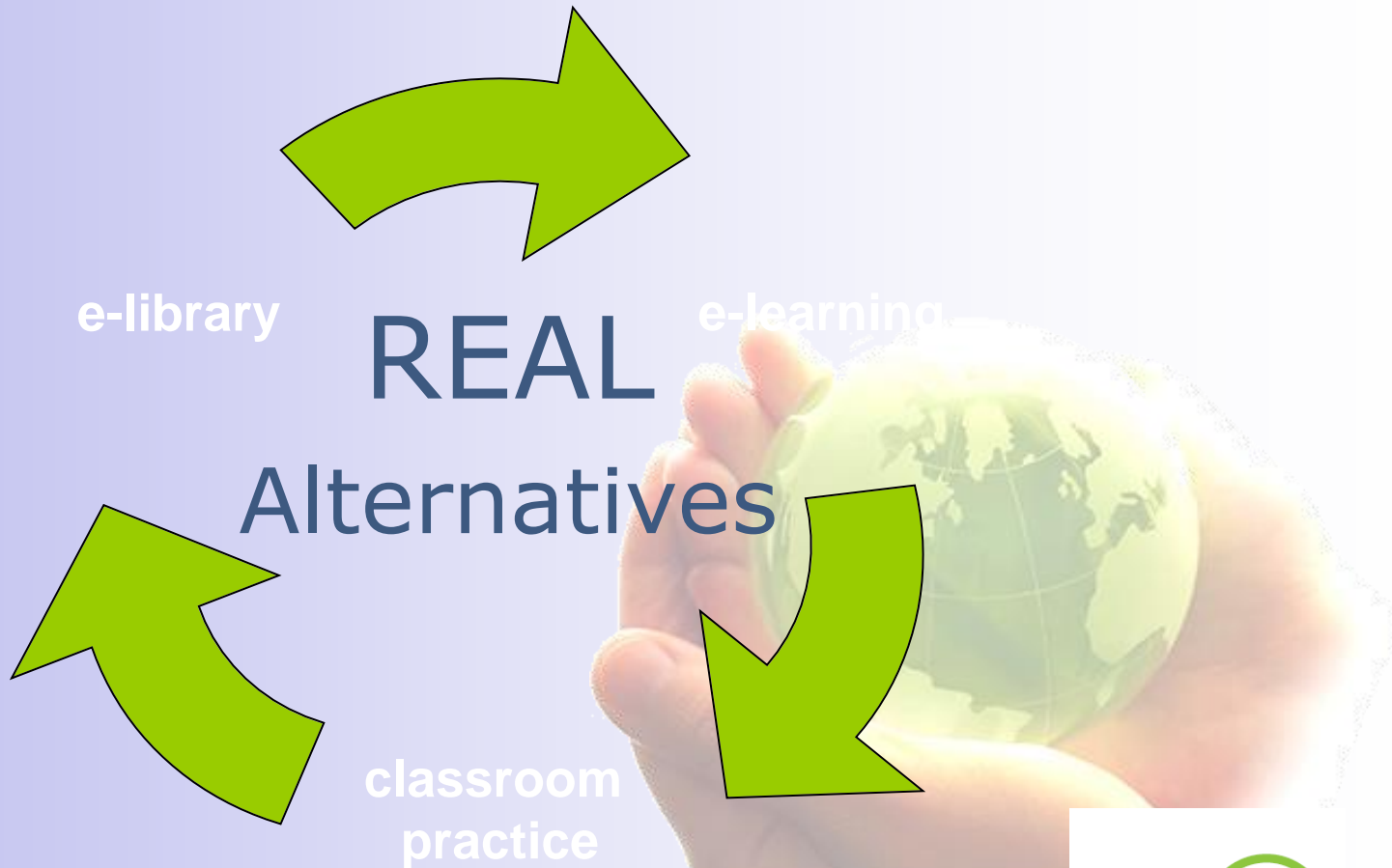
The technology focus will be on energy efficiency improvements; reduction of ODS leaks and reduction of contaminated refrigerants; and introduction of two types of demonstration systems – **one using hydrocarbon refrigerant for retrofits and a second full-scale CO₂ industrial or commercial unit with cascade** – to be piloted in a training environment.





Refrigerant Emissions and Leakage-blended learning for alternative refrigerants in new equipment

safety, efficiency, reliability and containment



We are proud to have among our stakeholders **the European Commission DG Clima & UNEP Ozone Action**





Refrigerant Emissions and Leakage-blended learning for alternative refrigerants in new equipment

safety, efficiency, reliability and containment

REAL alternatives is European project that will address skills shortages amongst technicians working in the refrigeration, air conditioning and heat pump sector

The focus will be on carbon dioxide, ammonia, hydrocarbon and HFO refrigerants. It will cover safety, efficiency, reliability and containment in service and maintenance. There will be a focus on refrigerant emissions and leakage.

Delivered through innovative blended learning - a mix of e-learning, face-to-face training materials and an e-library of learning resources from across Europe. Building on the success of REAL Skills Europe & REAL Zero containment programmes



THANK YOU!

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