

Topic B Briefing Paper: Barriers related to Training

This briefing paper was drafted by Ricardo-AEA and Gluckman Consulting on the basis of a study currently being carried out for DG Clima. It is intended to provide some background to participants at the Consultation Forum according to Regulation (EU) No 517/2014, held in Brussels on September 10th 2015. Topic B concerns training required by technicians and equipment designers to enable greater use of low GWP alternatives to HFCs.

1. Context of Topic B

The EU F-Gas Regulation 517/2014 includes a significant phase-down in the amount of HFCs that can be placed on the EU market; by 2030 there will be a 79% cut. The phase down of HFCs will require end users in the refrigeration, air-conditioning and heat pump (RACHP) markets to use alternative fluids with lower GWPs. In many cases this necessitates a switch from a non-flammable / non-toxic fluid to a refrigerant with less desirable properties. In particular, many of the low GWP alternatives being proposed might be flammable, toxic or operate at a very high pressure.

The current mandatory training required for F-Gas refrigerant handling (as specified in Commission Regulation 303/2008 and 307/2008) does not address the safe handling of flammable, toxic or high pressure alternatives to HFCs. To enable the widespread uptake of these lower GWP alternatives it is essential that there are a sufficient number of appropriately trained technicians and designers.

The F-Gas Regulation does require some limited extra training on low GWP alternatives. Article 10(3)e requires certification programmes and training to include *“information on relevant technologies to replace or to reduce the use of fluorinated greenhouse gases and their safe handling”*. However, this is intended as background information and does not mandate the detailed training that may be required to safely use refrigerants such as hydrocarbons and CO₂. It was not appropriate for the F-Gas Regulation to include mandatory training requirements for fluids that are not F-Gases. However, without widespread training being available, it will be difficult to achieve the challenging HFC phase-down targets that are included in the F-Gas Regulation.

To properly understand this issue it is necessary to:

- a) Identify and assess existing legislation that affects training related to non-HFC refrigerants including HCs, CO₂, ammonia and HFOs.
- b) Assess the quality of training material that is already available for non-HFC refrigerants.
- c) Assess the level of uptake of non-HFC training in different parts of the EU.

Some training for the available alternatives is known to be available. In this task we have identified the “training gap” that must be filled and investigated the legislative requirements for training.

2. DG Clima Study on Training

This briefing document is based on work being carried out in a study for DG Clima that identifies Union legislation relevant to training of personnel for safe use of HFC alternatives as well as examining the status quo situation in the Member States as regards the availability of training and identification of any training needs.

Article 21(6) of the F-Gas Regulation mandates the Commission to: "*publish a report examining Union legislation with respect to the training of natural persons for the safe handling of alternative refrigerants to replace or reduce the use of fluorinated greenhouse gases and shall submit, if appropriate, a legislative proposal to the European Parliament and to the Council to amend the relevant Union legislation*".

The work carried out in Topic B included a literature search, a Member State survey across the EU, assessment of current training materials and discussions with training experts and industry stakeholders. The scope of Topic B included only the refrigeration, air-conditioning and heat pump sectors (RACHP).

3. Preliminary Findings

Assessment of Member State Training Availability

The Member States survey received a good response, with data received from 22 countries representing 91% of the EU population.

All responding countries provided information about the number of F-Gas trained technicians. This data showed a total of 160,000 technicians hold an F-Gas refrigerant handling certificate in 21 countries. The data showed an average of 40 F-Gas trained technicians per 100,000 population. It also showed that the RACHP maintenance sector is dominated by small companies with an average of only 4 qualified technicians employed by each certified company.

The survey respondents were much less confident about providing data on training for non-F-Gas alternative refrigerants. Less than 30% of responders had any data at Member State level for the number of technicians trained in low GWP alternatives. The table below summarises key findings for non-F-Gas alternative refrigerants. The second column indicates whether responders could confirm that there is some formal training available. A significant proportion of EU Member States have some ammonia training available, but far less have training for HCs or HFOs.

	Available? % of countries	Number trained in EU	% of F-Gas trained
Ammonia	71%	4766	3%
CO2	52%	4400	2.7%
HC small	48%	1430	0.9%
HC larger	35%	112	0.07%
HFO / 2L	20%	0	0%

There is significant uncertainty about the data on numbers trained. Unlike the situation for F-Gases (where the certification schemes are mandatory EU-wide due to the F-gas Regulation and each Government had good access to training data) there is no requirement to provide and report on non-F-Gas training to a central authority, so for many Member States it was not possible to obtain accurate data. The column specifying numbers trained should be treated as an under-estimate, as other data collected showed that there was more training being carried out than that identified by survey responders. However, the data collected does indicate a significant lack of training for certain low GWP alternatives.

In the survey, 13 Member States indicated that they already have some plans to improve training provisions. For example:

- Bulgaria has an ongoing project with the assistance of the German Federal Environment Ministry entitled *“Implementation and enforcement of EU regulations on fluorinated greenhouse gases (FGHG) and ozone-depleting substances (ODS) in Bulgaria”*. One of its main objectives is gaining knowledge of the training that should be conducted related to alternative refrigerants.
- Estonia has launched a project to promote F-gas alternatives and low GWP technology in Estonia and help companies with the know how to make better choices. Within the project there are plans to map out best practices among EU Member States regarding low GWP alternatives and to determine, which of those measures are the most applicable in Estonia.
- Slovenia stated that they will include training for low GWP alternatives in existing certification and training programmes, as set out in Article 10, paragraph 8 of 517/2014.
- Spain stated that the Environment Ministry in coordination with other Ministries like Employment Ministry and Education Ministry are working to modify the official training system to the use of alternative technologies.
- UK stated that F-gas qualifications have been updated to cover aspects of low GWP alternatives. Safe Handling of Refrigerants publication will be updated to provide more information in low GWP area.

Other Training Availability Assessments

The results from the Member State survey were supported by excellent studies carried out into training needs (e.g. by the organisations REAL Alternatives, AREA, and Association Francaise du Froid). These studies included engagement with a significant number of stakeholders including RACHP installers, maintenance contractors and training providers. The studies showed reasonable training availability for ammonia, but insufficient capacity for the other refrigerants listed in the table above.

Availability of Training Materials for low GWP Alternatives

Although training is not yet widely adopted there have been excellent developments in relation to the availability of training materials.

Through the REAL Alternatives programme (a collaborative initiative involving training experts in Belgium, Germany, Italy, Poland, UK) a comprehensive suite of training materials has been developed. This is freely available through “e-learning” modules on the internet in English, Italian, Polish, Dutch and French, with a German version to be added shortly. It will be possible to add further languages in the future.

Various training centres across the EU already offer practical training courses that address all the low GWP alternatives. A French training study includes excellent descriptions of the required elements of training courses for the main alternatives (HCs, CO₂, ammonia, HFOs).

In addition to general training that can be obtained via traditional RACHP training centres there is also good training available from some equipment manufacturers. For example companies selling CO₂ systems for supermarkets have dedicated training available and companies selling small air-conditioning systems with lower flammability (A2L) refrigerants will only sell to installers that have undertaken product specific training provided by the manufacturer.

Why is training not more widespread?

The Member State survey and other training assessments show clearly that only a small proportion of RACHP technicians are adequately trained to deal with non-HFC alternatives. Given the availability of good training materials, why is the uptake low?

Discussions with industry experts indicate that this is mainly an issue of timing. The phase-down of HFCs only became clear in 2014 when the new F-Gas Regulation was published and the uptake of low GWP alternatives is only just beginning on a large scale. The majority of F-Gas trained technicians work for small contracting companies and it is likely that a significant majority of these companies have not yet worked on non-HFC alternatives. However, this situation will change quite rapidly in response to the HFC phase-down targets and significant efforts may be required to try and increase geographic availability of training and uptake amongst RACHP installation and maintenance contractors.

EU legislation affecting training for low GWP alternatives

An analysis of EU level legislation on training shows that there are a number of EU Directives (listed in Appendix A) that require suitable training for operatives working on non-HFC refrigerants.

The current legislation for F-Gases is unusual as it is highly prescriptive. Certification schemes are mandatory, based on minimum levels of training specified in a Commission Regulation. Without certification there are barriers to trade e.g. a maintenance contractor cannot purchase an HFC refrigerant without evidence of F-Gas refrigerant handling certification.

The training requirement for non-HFCs is far less prescriptive, but it is still important and it is also mandatory. The legislative requirements are less visible e.g. there are no certification requirements or minimum skill standards equivalent to those in the F-Gas Regulation. However, the relevant safety Directives require employers to carry out risk assessments to identify, amongst other things, appropriate training for their employees. Under such Directives it would be illegal for an employer to allow an employee to work on systems with, for example a flammable refrigerant unless they have adequate training.

EU standard EN 13313, "Refrigerating systems and heat pumps - Competence of personnel" sets training requirements for all refrigerants. This standard includes reference to safety issues. Training courses that address the requirements of EU safety Directives and also comply with EN 13313 should provide training that meets the legislative requirements.

Of particular importance is Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work – sometimes referred to as the OSH Framework Directive. This Directive encourages improvements in the safety and health of workers at work. It provides the general framework and principles of the protection of workers. It applies to all sectors of activity, both public and private, except for specific public service activities, such as the armed forces, the police or certain civil protection services. When applied to flammable or high pressure refrigerants it requires employers to consider measures that will mitigate any risks, including adequate training.

Also of importance is Directive 99/92/EC on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres – sometimes referred to as ATEX 137. This Directive places a responsibility on employers to provide appropriate training for works in relation to risks from explosive atmospheres. It does not specifically reference refrigerants, but is relevant to flammable refrigerants.

Preliminary Conclusions

The data collected on training shows that:

- The Member State survey shows there is a significant lack of engineers holding appropriate training for non-HFC alternative refrigerants. This finding is supported by other training studies recently carried out.
- The current legislative framework does not create any significant barriers. The mandatory training requirements for non-HFCs are less prescriptive than those for HFCs but they are already in place. If the requirements of Directives listed in Appendix A are combined with the requirements in EN 13313 there is a good framework for non-HFC training.
- There is already some very good training material available for non-HFC alternatives. The most easily accessible is via REAL Alternatives. Other material is already in use in a number of training centres in EU Member States.
- Despite the availability of training materials, the uptake of training is currently very low, especially for CO₂, HCs and A2L refrigerants.
- There is also a lack of geographic spread of training centres with non-HFC capabilities. In particular, there is a lack of practical training available using equipment containing refrigerants such as CO₂, HCs and HFOs.
- To meet the challenging phase-down targets there will need to be rapid uptake of low GWP alternatives. The lack of training could become a significant barrier unless significant efforts are made to (a) make appropriate training available and (b) encourage uptake.

4. Stakeholder Input Required

Topic B will be discussed during the afternoon session of the Workshop on September 10th. Feedback from stakeholders will be a crucial input into the development of the final project report and recommendations. DG Clima are very keen for attendees to provide input into the discussion. Please take the opportunity to provide feedback. Some of the key questions that will be debated during the discussion period include:

1. Other than the list in Appendix A, are there any other pieces of EU legislation that are relevant to training for non-HFC refrigerants
2. Do you agree that the EU legislative framework is generally sufficient as regards training needs or do you see shortcomings? Where?
3. Is there a further need for legislation at the Member State level in view of the rising importance of low GWP alternatives?
4. Do you agree that ammonia training is already sufficiently widespread?
5. For CO₂ HCs and A2Ls:
 - Is there sufficient basic training material already available (e.g. REAL Alternatives)?
 - How do we get more training centres equipped to deal with these refrigerants?
 - How do we encourage more engineers to take extra training?
6. How can we best assure that existing training gaps may be filled – action by service personnel associations at EU level/MS level; action by equipment producers/market; projects like REAL alternatives; others?

Appendix A

EU Legislation that directly affects alternative refrigerant training for technicians	
Directive 89/391/EEC - Framework Directive on Safety and Health at work	This Directive provides general requirements for the training of employees. The employer is required to ensure that workers receive adequate safety and health training.
ATEX 137 – Directive 99/92/EC on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres.	This Directive places a responsibility on employers to provide appropriate training for works in relation to risks from explosive atmospheres.
EU Legislation that indirectly affects alternative refrigerant training for equipment specifiers producers and distributors	
Pressure Equipment Directive (97/23/EC (and Recast 2014/68/EU))	These Directives are potentially relevant to products and goods that contain refrigerants, but focus on minimum safety standards which products must meet before they are placed on the market rather than training requirements for those handling refrigerants.
ATEX 95 – Explosive Atmospheres Directive (94/9/EC (and Recast 2014/34/EU))	
General Product Safety Directive (2001/95/EC)	
Directive - Low Voltage Directive (2006/95/EC (and Recast2014/35/EU))	
Electromagnetic Compatibility Directive (2004/108/EC (and Recast 2014/30/EU))	
Machinery Directive (2006/42/EC)	