realskills europe

Education and Culture DG
Lifelong Learning Programme

# Guidance, Tools and Training for Refrigerant Containment

Refrigerant Emissions and Leakage Skills for Europe

# Training Module Guide e-learning

## Guidance Notes

GN1: Guide to good leak testing

GN2: Illustrated guide to 13 common leaks

GN3: Designing out leaks: design standards and practices

GN4: Leakage matters: the service and maintenance contractor's responsibility

GN5: Leakage matters: the equipment owner's responsibility

GN6: F-Gas Logs and Emissions Calculator

TMG: Training module guide: e-learning

## Software Tools

Carbon Emissions/Cost Calculator and F-Gas Logging Tool

## Training

E-learning: see training guide TMG and visit the website for further details

**www.realskillseurope.eu**

*Guidance Notes and Software Tools are available as FREE downloads*



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# Training Module Guide

REAL Skills Europe (RSE) provides practical guidance to the refrigeration and air conditioning (RAC) industry to aid refrigerant leakage reduction. It has been funded by the EU Lifelong Learning Programme and the project partners. It provides

- 5 guides for service, maintenance and design engineers, contracting companies and end users;
- An electronic f-gas log and calculator to enable the financial and environmental impact of leakage to be determined;
- Seminars for RAC engineers and end users to discuss leakage reduction issues and best practice methods to achieve improvements;
- E-learning training for those who want to develop advanced skills in leakage reduction. The modules include self-test questions and an online assessment for RSE certification

Full details about REAL Skills Europe can be found at www.realskillseurope.eu. It is strongly recommended that you visit this site as part of this training.

## Leakage reduction training

This training material can be used in several ways. For example:

| Person | Recommendation | End result |
|---|---|---|
| Service and maintenance engineer | Experienced service and maintenance engineers can study Modules 1 and 2 to enhance leakage reduction skills and build on the EC 303/2008 certification[1]. | RSE CPD* certificates for modules 1 and 2 are awarded if they successfully complete online assessments. |
| Service supervisor, project manager | Experienced refrigeration engineers, who are certified to EC303/2008 Category 1[1] can enhance their understanding of how to deliver leakage reduction strategies by studying all four modules.<br>Modules 1 – 3 are assessed online. Module 4 is assessed by submitting a site survey report that is assessed by an independent REAL SKILLS EUROPE assessor. | RSE CPD* certificates are awarded for each module that has been successfully completed and assessed. |
| To join the REAL SKILLS EUROPE Register (website listing) | Be an experienced RAC engineer with practical experience and evidence of competence in accordance with EU standard pr EN 13313:2010.<br><br>Hold EC303/2008 Category 1 certification[1].<br><br>Successfully complete all 4 modules. The assessments for modules 1 – 3 must be carried out under exam conditions (invigilated process). Module 4 is assessed by submitting a site survey report that is assessed by an independent REAL SKILLS EUROPE assessor. | RSE Gold CPD* certificates (gained under exam conditions)<br><br>Inclusion in the REAL Skills Europe website listing (individuals who may be able to offer advice and guidance on leakage reduction to others)<br><br>Use of REAL Skills Europe site inspection proformas and standard reports |

[1] *In the UK the relevant EC 303/2008 Category 1 qualifications are City and Guilds 2079-11 and Construction Industry Training Board CITB J11.*


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** CPD – Continuing Personal or Professional Development - is the term that describes a commitment to structured skills enhancement and personal or professional competence. The Institute of Refrigeration has gained independent CPD Certification of this training material by the Construction CPD Service.*

The training material is also an invaluable resource for anyone wanting to find out more about how to reduce refrigerant leakage.

If you wish to obtain REAL Skills Europe Continuing Professional Development (CPD) Certification you must register for the leakage reduction training course, which includes four modules, three on line assessment tests and the review of a site survey report that has been carried out using REAL Skills Europe methodology and reporting format. On successful completion of the assessments you will be sent your CPD certificates.

You will also be eligible to join the REAL Skills Europe Register if you have passed all four modules through an invigilated assessment process, possess a current EC303/2008 Category 1 certificate and can show evidence of competence in accordance with EU standard pr EN 13313:2010.

See the REAL Skills Europe website training page http://www.realskillseurope.eu/training for details of how to apply for training.

## The modules

The training is split into four modules as outlined in the table below.

| Module | Topics | Assessment |
|---|---|---|
| **1**<br>Environmental, cost and legal aspects of refrigerant leakage.<br><br>Approximately 5-10 hours learning time | 1.1. Environmental impact of refrigerants and systems (GWP, ODP, TEWI, $CO_2$ equivalent emissions)<br>1.2. Calculating the financial cost of leakage.<br>1.3. REAL Skills Europe calculators.<br>1.4. Legal obligations under the F Gas regulation.<br>1.5. Making a case for reduced leakage.<br>1.6. Generic information about common leak points. | On-line via e-learning website (invigilated assessment required for RSE Gold CPD certificate) |
| **2**<br>Reducing leakage through appropriate maintenance and service.<br><br>Approximately 5-10 hours learning time | 2.1. System maintenance regimes for minimum leakage.<br>2.2. Records for effective refrigerant management.<br>2.3. Direct leak testing methods (spray/ soapy water, electronic, fluorescent additives, ultrasonic, checking leak detectors).<br>2.4. Indirect leak testing methods.<br>2.5. Fixed leak detection systems.<br>2.6. How to reduce leak potential in existing systems. | On-line via e-learning website (invigilated assessment required for RSE Gold CPD certificate) |


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| | | |
|---|---|---|
| **3**<br>Minimising Leakage – Good Practice for Design, Installation and Commissioning<br>Approximately 5-10 hours learning time | 3.1. System design basics for minimum leakage (refrigerant type, system capacity, system design, refrigerant charge, head pressure, components)<br>3.2. Key pressures.<br>3.3. Pipe design.<br>3.4. Over pressure protection.<br>3.5. Installation for minimum leakage.<br>3.6. The importance of commissioning.<br>3.7. Fixed leak detection. | On-line via e-learning website (invigilated assessment required for RSE Gold CPD certificate) |
| **4**<br>Reducing leakage through site specific surveys and advice.<br><br>Approximately 5-10 hours learning time (plus site survey and written report) | 4.1. Site surveys to identify areas where leakage can be reduced (explaining the process to end users, conducting the survey).<br>4.2. Calculating the correct refrigerant charge amount.<br>4.3. Preparing a strategy for leakage reduction (use of data and historical records, equipment condition and age, compliance with legislation, assessing leakage potential).<br>4.4. Preparation of reports with recommendations for leakage reduction strategies. | Submission of a site survey report from a leakage reduction survey carried out in accordance with RSE methods |

## Learning outcomes of REAL Skills Europe Training.

The REAL SKILLS EUROPE training course content, delivery and assessment methods have been designed to impart knowledge and satisfy the key learning outcomes set out in the following paragraphs. The training complements the mandatory F-Gas certification (EC 303/2008) by developing additional skills that help to prevent leaks from occurring.

**Module 1: Environmental, cost and legal aspects of refrigerant leakage.**

On successful completion of the module students will be able to:

- Explain the environmental and financial impact of refrigerant leakage and the importance of leak containment
- Describe why and where leaks occur
- Explain GWP, ODP and TEWI and State the GWPs or various refrigerants
- Calculate the carbon equivalent emissions and costs of refrigerant leakage
- Identify the scale of refrigerant leakage
- Explain the relevance of F-Gas and ODS Regulations and the related legal obligations of RAC system owners, operators and maintainers
- List RAC system registers, labelling, F-Gas logs and reporting requirements
- Discuss the principles of effective refrigerant management
- Explain the potential cost benefits of a refrigerant leakage reduction programme

**Module 2: Reducing leakage through appropriate maintenance and service.**

On successful completion of the module students will be able to:

- Describe RAC System maintenance concepts, best practice regimes and methods to minimize leakage


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- Explain how to reduce leaks in existing RAC systems
- Employ F Gas log data records to manage and analyse the use and containment of refrigerants
- Propose how to prevent refrigerant leakage, identifying areas that pose a high risk of leak potential
- Select leak detection methods and equipment that are appropriate for the type of RAC system and refrigerant contained within it
- Describe and compare leak test procedures (including pressure testing) and how to improve the effectiveness of leak detection
- Explain refrigeration system health checks and interpret and analyse the data
- Evaluate RAC system performance parameters for indications of potential for leakage
- Propose a maintenance specification and schedule for a system to minimise leakage

**Module 3: Minimising Leakage – Good Practice for Design, Installation and Commissioning**

On successful completion of the module students will be able to:

- Describe the principles of RAC system design for minimizing leak potential
- Illustrate the importance of using standards to aid the design process
- Assess appropriate application of REAL SKILLS EUROPE principles in specifying components in RAC systems to minimize leakage potential
- Demonstrate correct use, installation and positioning of refrigerant pipe work for minimum leak potential
- Explain the use of EN 378 to calculate design temperatures and pressures and the use of protection devices
- Specify installation procedures which minimise leakage
- Specify commissioning procedures which minimise leakage
- Compare the effectiveness of different types of fixed leak detection systems

**Module 4: Reducing leakage through site specific surveys and advice**

On successful completion of the module students will be able to:

- Describe the underlying procedures for effective surveys and audits
- Undertake REAL SKILLS EUROPE site surveys
- Appraise how a system may be improved to reduce leak risk
- Calculate the refrigerant charge in a system using a charge calculator and other methods
- Collect and evaluate site survey data using the RSE site survey record sheet
- Assess leakage risks and the potential for leakage reduction
- Provide advice and recommendations to customers on reducing refrigerant leakage at their sites
- Write REAL SKILLS EUROPE site survey reports for customers (based on a RSE standard format)
- Evaluate the effectiveness of site surveys and follow up actions to reduce leakage and contain refrigerant

The full training specification is available from the RSE website.
**Register for the training scheme at** www.realskillseurope.eu

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