
REGULATED QUALIFICATION FRAMEWORK (RQF)

QUALIFICATION SPECIFICATION

- **LCL Awards Level 3 Award in F-Gas: Install, Service, Maintain, Recovery, Decommission and Leakage Checking of Systems (Category I)**
- **LCL Awards Level 3 Award in F-Gas: Install, Service, Maintain, Recovery, Decommission and Leakage Checking of Refrigerant Systems with a Charge of less than 3kg (6kg if hermetically sealed) (Category II)**
- **LCL Awards Level 2 Award in F-Gas: Recovery of Refrigerant Systems with a Charge of less than 3kg (6kg if hermetically sealed) (Category III)**
- **LCL Awards Level 2 Award in F-Gas: Leakage Checking of Refrigerant Systems (Category IV)**

1. Objective:

The aim of these qualifications is to provide the learner with the knowledge and skills to install, service, maintain, recover and leak checking of stationary refrigeration equipment that contains refrigerants classified as fluorinated Greenhouse Gases as required by Regulation (EU) 2015/2067.

The Fluorinated Greenhouse Gases Regulations 2015 (England and Wales) and The Fluorinated Greenhouse Gases Regulations (NI) 2015 means it is an offence for an individual to work with fluorinated greenhouse gases without holding one of the qualifications listed within the regulations.

Logic Certification Limited (T/A LCL Awards) is recognised by DEFRA as a designated certifier and evaluation body for the issue of certificates for natural persons for stationary refrigeration, air conditioning, heat pump equipment and refrigerated trucks and trailers containing fluorinated greenhouse gasses.

These qualifications are designed to meet the legal requirements of learners who work or intend to work with fluorinated gases, allowing learners to continue to learn, develop and practise the skills required for employment within the fluorinated greenhouse gas sector, to reduce direct greenhouse gas emissions by limiting the release of fluorinated and other greenhouse gases and thereby reducing the indirect greenhouse gas emissions and improving the energy efficiency of stationary refrigeration equipment.

The target groups for the qualification are those learners who are;

1. Updating occupational competence, continuous professional development and or obtaining a licence to practice
2. Preparing for further learning or training and/or developing knowledge and or skills in a subject area who are existing workers in the occupation seeking to extend their range of work

2. Qualification Framework:

| Regulator | Qualification Number | Qualification Title(s): | Category | Level | TQT | GLH |
|----------------------|----------------------|--|----------|-------|-----|-----|
| Ofqual | 603/1917/3 | LCL Level 3 Award in F-Gas: Install, Service, Maintain, Recovery, Decommission and Leakage Checking of Systems (Category I) | Cat I | 3 | 31 | 31 |
| CCEA | | | | | | |
| Qualifications Wales | | | | | | |
| Ofqual | 603/1918/5 | LCL Level 3 Award in F-Gas: Install, Service, Maintain, Recovery, Decommission and Leakage Checking of Refrigerant Systems with a Charge of less than 3kg (6kg if hermetically sealed) (Category II) | Cat II | 3 | 31 | 31 |
| CCEA | | | | | | |
| Qualifications Wales | | | | | | |
| Ofqual | 603/1919/7 | LCL Level 2 Award in F-Gas: Recovery of Refrigerant Systems with a Charge of less than 3kg (6kg if hermetically sealed) (Category III) | Cat III | 2 | 7 | 7 |
| CCEA | | | | | | |
| Qualifications Wales | | | | | | |
| Ofqual | 603/1920/3 | LCL Level 2 Award in F-Gas: Leakage Checking of Refrigerant Systems (Category IV) | Cat IV | 2 | 14 | 14 |
| CCEA | | | | | | |
| Qualifications Wales | | | | | | |

Condition of certification

Note: Certificates issued within this qualification specification are valid for a period of **5 years** from the date of issue.

3. Unit Grading Structure:

The learner is required to successfully achieve a pass for this qualification to be awarded.

4. Unit specification:

Assessment Method (MCQ/MRQ/RWE)

| Learning Outcome 01. The learner will know the fundamental principles of thermodynamics. | Category | | | |
|---|----------|----|-----|----|
| | I | II | III | IV |
| The learner will know: | | | | |
| 1.1 State the ISO standard units as for temperature, pressure, mass, density, and energy. | √ | √ | - | √ |
| 1.2 The following thermodynamic terms; <ol style="list-style-type: none"> 1. Superheat, 2. High Side, Heat of Compression, 3. Enthalpy, Refrigeration Effect, 4. Low Side, (Sub-cooling), properties 5. Thermody-namic transformations of refrigerants including the identification of zeotropic blends and fluid states. | √ | √ | - | - |
| 1.3 How to interpret tables and diagrams in the context of; Indirect leakage checking (including checking of the good operation of the system), <ul style="list-style-type: none"> • A log p/h diagram, • Saturation tables of a refrigerant, • A single compression refriger-ation cycle. | √ | √ | - | - |
| 1.4 The function of the main components in the system <ul style="list-style-type: none"> • Compressor, • Evaporator, • Condenser, • Thermostatic expansion valves • The thermodynamic transformations of the refrigerant. | | √ | - | - |
| 1.5 The operation of the following components used in a refrigeration system and their role and importance for refrigerant leakage prevention and identification; <ol style="list-style-type: none"> a. Valves (ball valves, diaphragms, globe valves, relief valves), b. Temperature and pressure controls, c. Sight glasses and moisture indicators, d. Defrost controls, e. System protectors, f. Measuring devices g. Oil control systems, h. Receivers, i. Liquid and oil separators. | √ | - | - | - |
| 1.6 The specific; <ul style="list-style-type: none"> • Behaviour, • Physical parameters, • Solutions, systems, • Deviances of alternative refrigerants in the refrigeration cycle and components for their use. | √ | √ | √ | √ |

| Learning Outcome 02. The learner will know the environmental impact of refrigerants and corresponding environmental regulations. | Category | | | |
|--|-----------------|-----------|------------|-----------|
| | I | II | III | IV |
| The learner will know: | | | | |
| 2.1 Outline the EU and international climate change policy, including the United Nations Framework Convention on Climate Change. | √ | √ | √ | √ |
| 2.2 The; <ul style="list-style-type: none"> • Concept of Global Warming Potential (GWP), • The use of fluorinated greenhouse gases and other substances as refrigerants, • The impact of the emissions of fluorinated greenhouse gases on the climate (order of magnitude of their GWP) • The relevant provisions of Regulation (EU) No 517/2014 and of the relevant implementing acts | √ | √ | √ | √ |

| Learning Outcome 03. The learner will be able to carry out checks before putting in operation, after a long period of non-use, after maintenance or repair intervention, or during operation. | Category | | | |
|--|-----------------|-----------|------------|-----------|
| | I | II | III | IV |
| The learner can: | | | | |
| 3.1 Carry out a pressure test to check the strength of the system. | | √ | - | - |
| 3.2 Carry out a pressure test to check the tightness of the system. | √ | √ | - | - |
| 3.3 Use a vacuum pump. | | √ | - | - |
| 3.4 Evacuate the system to remove air and moisture according to standard practice. | | √ | - | - |
| 3.5 Fill in the data in the equipment records and fill in a report about one or more tests and checks carried out during the examination. | √ | √ | - | - |

| Learning Outcome 04. The learner will be able to check for leakage | Category | | | |
|--|-----------------|-----------|------------|-----------|
| | I | II | III | IV |
| The learner can: | | | | |
| 4.1 Identify the potential leakage points of refrigeration, air conditioning and heat pump equipment. | √ | √ | - | √ |
| 4.2 Check equipment records prior to a check for leakage and identify the relevant information on any repeating issues or problem areas to pay special attention to. | √ | √ | - | √ |
| 4.3 Make a visual and manual inspection of the whole system in accordance with the current Commission Regulation (EC) | √ | √ | - | √ |
| 4.4. Carry out a check for leakage of the system using an indirect method in accordance with the current Regulation (EC) and the instruction manual of the system | √ | √ | - | √ |

| | | | | |
|--|---|---|---|---|
| 4.5 Use portable measuring devices including; <ul style="list-style-type: none"> • Manometer sets, • Thermometers • Multi meters for measuring Volt/Amp/Ohm in the context of indirect methods for leakage checking, and interpret the measured readings. | √ | √ | - | √ |
| 4.6 Carry out a check for leakage of the system using one of the direct methods referred to in the current Regulation (EC) | √ | - | - | - |
| 4.7 Carry out a check for leakage of the system using one of the direct methods which does not entail breaking into the refrigeration circuit, referred to in the current Regulation (EC) | - | √ | - | √ |
| 4.8 Use an appropriate electronic leak detection device | √ | √ | - | √ |
| 4.9 Fill in the data in the equipment records | √ | √ | - | √ |

| Learning Outcome 05. The learner will be able to environment friendly handle the system and refrigerant during installation, maintenance, servicing or recovery. The learner can: | Category | | | |
|---|----------|----|-----|----|
| | I | II | III | IV |
| 5.1 Connect and disconnect gauges and lines with minimal emissions. | √ | √ | - | - |
| 5.2 Empty and fill a refrigerant cylinder in both liquid and vapour state. | √ | √ | √ | - |
| 5.3 Use a recovery set to recover refrigerant and connect and disconnect recovery set with minimal emissions. | √ | √ | √ | - |
| 5.4 Drain F-gas contaminated oil out of a system. | √ | √ | √ | - |
| 5.5 Identify refrigerant state (liquid, vapour) and condition (subcooled, saturated or superheated) prior to charging, to ensure correct method and volume of charge. | √ | √ | - | - |
| 5.6 Fill the system with refrigerant (both in the liquid and vapour phase) without loss of refrigerant. | √ | √ | - | - |
| 5.7 Choose the correct type of scales and use them to weigh the refrigerant. | √ | √ | √ | - |
| 5.8 Fill in the equipment records with all relevant information concerning the refrigerant recovered or added. | √ | √ | - | - |
| 5.9 Follow the requirements and procedures for handling, reusing, reclaiming, storage and transportation of contaminated refrigerant and oils. | √ | √ | √ | - |

Note: The examination for category I & II learners shall cover at least one of the following skill and knowledge groups 6, 7, 8 or 9 (Cat I only)

| Learning Outcome 06. The learner will be able to put into operation and maintain reciprocating, screw and scroll compressors, single and two-stage. | Category | | | |
|---|----------|----|-----|----|
| | I | II | III | IV |
| The learner can: | | | | |
| 6.1 Explain the basic functioning of a compressor (including capacity control and lubricating system) and risks of refrigerant leakage or release associated to it. | √ | √ | - | - |
| 6.2 Install a compressor, including control and safety equipment, so that no leak or major release occurs once the system is put into operation. | √ | √ | - | - |
| 6.3 Adjust the safety and control switches. | √ | - | - | - |
| 6.4 Adjust the suction and discharge valves. | | - | - | - |
| 6.5 Check the oil return system. | | - | - | - |
| 6.6 Start up and shut down a compressor and check the working conditions of the compressor, including by making measurements during the operation of the compressor. | √ | √ | - | - |
| 6.7 Write a report about the condition of the compressor which identifies any problems in the functioning of the compressor that could damage the system and eventually lead to refrigerant leakage or release should no action be taken. | √ | √ | - | - |

| Learning Outcome 07. The learner will be able to install, put into operation and maintain air cooled and water cooled condensers. | Category | | | |
|--|----------|----|-----|----|
| | I | II | III | IV |
| The learner can: | | | | |
| 7.1 Explain the basic functioning of a condenser and risks of leakage associated to it | √ | √ | - | - |
| 7.2 Adjust a discharge pressure control of the condenser. | √ | - | - | - |
| 7.3 Install a condenser/outdoor unit, including control and safety equipment, so that no leak or major release occurs when the system has been put into operation. | √ | √ | - | - |
| 7.4 Adjust the safety and control switches. | √ | - | - | - |
| 7.5 Check the discharge and liquid lines. | | - | - | - |
| 7.6 Purge non-condensable gases out of the condenser using a refrigeration purging device. | √ | - | - | - |
| 7.7 Start up and shut down a condenser and check the working condition of the condenser including by making measurements during operation. | √ | √ | - | - |

| | | | | |
|--|---|---|---|---|
| 7.8 Check the surface of the condenser. | √ | √ | - | - |
| 7.9 Write a report about the condition of the condenser which identifies any problems in the functioning that could damage the system and eventually lead to refrigerant leakage or release should no action be taken. | √ | √ | - | - |

| Learning Outcome 08. The learner will be able to install, put into operation and maintain air cooled and water cooled evaporators. | Category | | | |
|--|-----------------|-----------|------------|-----------|
| | I | II | III | IV |
| The learner can: | | | | |
| 8.1 Explain the basic functioning of an evaporator (including defrosting system) and risks of leakage associated to it. | √ | √ | - | - |
| 8.2 Adjust an evaporating pressure control of the evaporator. | √ | - | - | - |
| 8.3 Install an evaporator including control and safety equipment, so that no leak or major release occurs when the system has been put into operation. | √ | √ | - | - |
| 8.4 Adjust the safety and control switches. | √ | - | - | - |
| 8.5 Check the liquid and suction pipelines in the correct position. | | - | - | - |
| 8.6 Check the hot gas defrost pipeline. | | - | - | - |
| 8.7 Adjust evaporation pressure regulation valve. | | - | - | - |
| 8.8 Start up and shut down an evaporator and check the working condition of the evaporator, including by making measurement during operation. | √ | √ | - | - |
| 8.9 Check the surface of the evaporator. | √ | √ | - | - |
| 8.10 Write a report about the condition of the evaporator which identifies any problems in the functioning that could damage the system and eventually lead to refrigerant leakage or release should no action be taken. | √ | √ | - | - |

| Learning Outcome 09. The learner will be able to install, put into operation and the servicing of Thermostatic Expansion Valves (TEV) and other components. | Category | | | |
|--|-----------------|-----------|------------|-----------|
| | I | II | III | IV |
| The learner can: | | | | |
| 9.1 Explain the basic functioning of different kinds of expansion regulators (thermostatic expansion valves, capillary tubes) and risks of leakage associated to it. | √ | √ | - | - |
| 9.2 Install valves in the correct position. | √ | - | - | - |

| | | | | |
|---|---|---|---|---|
| 9.3 Adjust a mechanical/electronic TEV. | √ | - | - | - |
| 9.4 Adjust mechanical and electronic thermostats. | | - | - | - |
| 9.5 Adjust a pressure-regulated valve. | | - | - | - |
| 9.6 Adjust mechanical and electronic pressure limiters. | | - | - | - |
| 9.7 Check the functioning of an oil separator. | √ | - | - | - |
| 9.8 Check the condition of a filter dryer | √ | - | - | - |
| 9.9 Write a report about the condition of these components which identifies any problems in the functioning that could damage the system and eventually lead to refrigerant leakage or release should no action be taken. | √ | - | - | - |

| | | | | |
|---|-----------------|-----------|------------|-----------|
| Learning Outcome 10. The learner will be able to build a leak-tight piping system in a refrigeration installation. | Category | | | |
| The learner can: | I | II | III | IV |
| 10.1 Weld, braze and/or solder leak-free joints on metallic tubes, pipes and components that can be used in refrigeration, air conditioning or heat pump systems. | √ | √ | - | - |
| 10.2 Make/check pipe and component supports. | √ | √ | - | - |

| | | | | |
|---|-----------------|-----------|------------|-----------|
| Learning Outcome 11. The learner will know the information on relevant technologies to replace or to reduce the use of fluorinated greenhouse gases and their safe handling. | Category | | | |
| The learner can: | I | II | III | IV |
| 11.1 Outline the relevant alternative technologies to replace or to reduce the use of fluorinated greenhouse gases and about their safe handling. | √ | √ | √ | √ |
| 11.2 Outline the relevant system designs to reduce the charge size of fluorinated greenhouse gases and to increase energy efficiency. | √ | - | - | - |
| 11.3 Outline the relevant safety regulations and standards for the use, storage and transportation of flammable or toxic refrigerants or refrigerants requiring higher operating pressure. | √ | √ | - | - |
| 11.4 State the respective advantages and disadvantages, notably in relation to energy efficiency, of alternative refrigerants according to the intended application and to the climate conditions of the different regions. | √ | √ | - | - |

5. National Occupational Standard:

These qualifications are based on Regulation (EU) 2015/2067 and have been written and approved by DEFRA.

6. RQF Descriptor Level 2/3.

The RQF Level Descriptor sets out what the learner achievement at level 2 reflects in the following generic areas;

Level 2 Knowledge Descriptor (the holder)

- *Has knowledge and understanding of facts, procedures and ideas in an area of study or field of work to complete well-defined tasks and address straightforward problems.*
- *Can interpret relevant information and ideas.*
- *Is aware of a range of information that is relevant to the area of study or work.*

Level 2 Skills Descriptor (the holder can)

- *Use basic cognitive and practical skills to complete well-defined routine tasks and procedures.*
- *Select and use relevant information.*
- *Identify whether actions have been effective.*

The RQF Level Descriptor sets out what the learner achievement at level 3 reflects in the following generic areas;

Level 3 Knowledge Descriptor (the holder)

- *Has factual, procedural and theoretical knowledge and understanding of a subject or field of work to complete tasks and address problems that while well-defined, may be complex and non-routine.*
- *Can interpret and evaluate relevant information and ideas.*
- *Is aware of the nature of the area of study or work.*
- *Is aware of different perspectives or approaches within the area of study or work.*

Level 3 Skills Descriptor (the holder can)

- *Identify, select and use appropriate cognitive and practical skills, methods and procedures to address problems that while well defined, may be complex and non-routine.*
- *Use appropriate investigation to inform actions.*
- *Review how effective methods and actions have been.*

7. Prior qualifications, knowledge, skill or understanding which the learner is required to have before taking this qualification. (Pre-requisites)

Category I & II are Level 3 CPD qualifications designed for learners working within the Refrigeration and or related service sector. Learners wishing to undertake Category (I) or (II) qualifications must hold a recognised qualification in Refrigeration, Heating & Ventilation or other related industry sector or have a minimum of 2 years auditable experience working within the Refrigeration or Heating & Ventilation sector. All learners must have a good practical working knowledge of different soldering and brazing methods to undertake this type of work.

Learners registered on and undertaking an apprenticeship or qualification which has a requirement for Category I or II F-Gas classification are exempt from the published pre-requisites above.

Category III & IV are Level 2 qualifications and have no pre-requisites, they may be undertaken by any learner after initial assessment by the approved centre.

8. Units which a learner must have completed before the qualification will be awarded and any optional routes.

Learners must complete the relevant mandatory unit before the qualification will be awarded.

See Section 4.0 above.

9. Other requirements which a learner must have satisfied before the learner will be assessed or before the qualification will be awarded.

None

10. The design and delivery of the examination associated with these units are based on the following documents;

The design of the qualification(s) is based on the requirements of European Standard Regulation (EU) 2015/2067 and UK Statutory Instrument 2015 No. 310. The Fluorinated Greenhouse Gases Regulations 2015. The Fluorinated Greenhouse Gases Regulations (Northern Ireland) 2015:

11. The criteria against which learners' level of attainment will be measured.

Learners must have successfully completed the relevant practical assessments and written examination(s) before the qualification will be awarded by LCL Awards. These are detailed in Section 4 of this specification.

12. Planned exemptions

None

13. Specimen assessment materials.

F-Gas workbook 517/2014. (ISBN [0992760437](#))

14. Specified levels of attainment

Learners must pass 1 mandatory unit for the qualification to be awarded.

15. Other information

Where the qualification(s) is awarded in the various devolved regions of the UK i.e. England, Scotland, Northern Ireland and Wales, the examination questions and learner responses to those questions are set and responded to in the context of the legislation, normative standards and guidance applicable in that region. Assessors will mark

examinations in accordance with the generic model answers and rationales provided by LCL taking into account any variations applicable to that region.

SSAs: 4.1 Engineering

Review Date 01.04.2023

Assessment and Examination Terminology

AC – *Approved Centre; an examination conducted either at the approved centre or a location approved by the centre, using staff approved by the centre to conduct the examination.*

CBSR – **Closed Book** *Short Response; Short response written questions will be set by the awarding organisation and administered and marked locally at the approved centre by approved markers. Learners will be prohibited from using industry normative or informative documents.*

CE – *Customer Evidence; evidence provided by a customer in the form of a written witness statement confirming a competent performance by the learner. That evidence may also be provided by an employing supervisor or manager of the learner. Witness statements that relate to a technical competence will only be accepted from a person technically competent in that particular activity to provide the statement.*

IK – *Inferred Knowledge; inferred knowledge is assessed as part of a performance assessment by a centre approved assessor. To deem the learner as having sufficient knowledge the learner must satisfactorily pass the performance assessment.*

LE – *Learner Evidence; learner generated evidence is for example documented recordings of readings, calculations or the production of a risk assessment or other procedural document.*

MC – *Multiple Choice; set by the awarding organisation and administered and marked locally or electronically. Learners will be able to answer multi-choice questions using reference to appropriate industry normative or informative sources.*

O/L – *On-line: a secure web-based assessment system (XAMS)*

OP – *Observed Performance; the assessment of a learner's performance by an approved assessor either in the learner's work place or at the approved centre or a location approved by the centre.*

OQ – *Oral Questions; oral questions may be asked by an assessor as part of a performance assessment or knowledge examination to confirm the understanding of the criteria by the learner.*

PA – *Performance Assessment; a performance assessment conducted either in the learner's work place or at the approved centre or a location approved by the centre.*

RWE – *Realistic Work Environment; an area at the approved centre or a location approved by the centre which replicates and has the features of a Work Place. The learner must not be permitted to be familiar with the simulated environment prior to undertaking assessment.*

WP – *Work Place; is the naturally occurring environment in which the learner works, typically that would be in a customer's premise where work is being paid for by the customer.*