Assessment Criteria

for

IMI Level 3 Award in
Cargo Refrigerant Handling
(EC842-2006)

OFGUAL I.D NO: 600/1954/2

To be used in conjunction with Learner Guidance, Candidate Assessment Summary and Practical Assessments
CENTRE INFORMATION

Please be aware that any **legislation** referred to in this qualification may be subject to amendment/s during the life of this qualification. Therefore IMI Approved Centres must ensure they are aware of and comply with any amendments, e.g. to health and safety legislation and employment practices.

Please be aware that **vehicle technologies** referred to in this qualification reflect current practice, but may be subject to amendment/s, updates and replacements during the life of this qualification. Therefore IMI Approved Centres must ensure they are aware of the latest developments and emerging technologies to ensure the currency of this qualification.

Please note: the relevance of the information contained in the **unit content** will vary depending upon the vehicle types being worked upon. The unit content is for guidance only and is not meant to be prescriptive.
## CONTACT SHEET

| Learner Name: |  |
| Learner Registration No: |  |
| Learner Address: |  |
| Learner Tel No: |  |
| Learner Email: |  |
| Employer Contact: |  |
| Employer Name & Address: |  |
| Employer Tel No: |  |

### Please complete as appropriate:

| Witness Name: | Witness Name: |
| Witness Job Title: | Witness Job Title: |
| Witness Signature: | Witness Signature: |
| Witness Name: | Witness Name: |
| Witness Job Title: | Witness Job Title: |
| Witness Signature: | Witness Signature: |
| Assessor Name: | Assessor Name: |
| Assessor Signature: | Assessor Signature: |
| Assessor Name: |  |
| Assessor Signature: |  |
| Internal Verifier Name: | Internal Verifier Name: |
| Internal Verifier Signature: | Internal Verifier Signature: |
IMI Level 3 Award in Cargo Refrigerant Handling  
(EC 842-2006)

I.D NO: 600/1954/2

<table>
<thead>
<tr>
<th>Unit Ref:</th>
<th>Unit Title and I.D Number</th>
<th>GLH</th>
<th>Unit Level</th>
<th>Credit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR1</td>
<td>Cargo Refrigeration (EC 842-2006) (K/503/1097)</td>
<td>14</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>
### UNIT REF: CR1  UNIT TITLE: CARGO REFRIGERATION (EC 842-2006)

<table>
<thead>
<tr>
<th>Level: 3</th>
<th>Route: Air Conditioning and Climate Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit Value: 2</td>
<td></td>
</tr>
</tbody>
</table>

**Rationale:** After July 2010 all individuals working on Mobile Air Conditioning (MAC) systems (for automotive refrigerated cargo) must have achieved, as a minimum requirement, a refrigerant handling qualification which meets Mobile Air Conditioning (MAC) Commission Regulation EC 842/2006 and the later Annex to Commission Regulation EC 307/2008. This unit meets those requirements, thereby enabling individuals to work on these systems after this date.

### LEARNING OUTCOMES

The Learner will:

1. Know about the operation of refrigeration systems in automotive refrigerated cargo vehicles
2. Know about the use and properties of the fluorinated greenhouse gases used as refrigerants in automotive refrigerated cargo vehicles and the impact of the emissions of these gases on the environment (order of magnitude of their global warming potential in relation to climate change)
4. Know the common procedures for recovering fluorinated greenhouse gases
5. Be able to demonstrate how to handle a refrigerant cylinder
6. Be able to connect and disconnect a recovery set to and from the service ports of an automotive refrigerated cargo system containing fluorinated greenhouse gases
7. Be able to operate a recovery set
<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>ASSESSMENT CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Learner will:</strong></td>
<td><strong>The Learner can:</strong></td>
</tr>
</tbody>
</table>
| 1. Know about the operation of automotive refrigerated cargo systems. | 1.1 Identify the component parts of an automotive refrigerated cargo systems  
1.2 Describe operating principles of automotive refrigerated cargo systems |
| 2. Know about the use and properties of the fluorinated greenhouse gases used as refrigerants in automotive refrigerated cargo systems and the impact of the emissions of these gases on the environment (order of magnitude of their global warming potential in relation to climate change) | 2.1 Outline the environmental issues relating to refrigerants  
2.2 Explain related legislation and regulations when carrying out operations on automotive refrigerated cargo systems  
2.3 State the types, use and properties of fluorinated gases  
2.4 Identify health risks associated with automotive refrigerated cargo systems and the appropriate health and safety measures to reduce these risks |
3.2 Describe the main requirements of Directive 2006/40/EC |
| 4. Know the common procedures for recovering fluorinated greenhouse gases | 4.1 Explain the procedures for recovering fluorinated greenhouse gases |
| 5. Be able to demonstrate how to handle a refrigerant cylinder | 5.1 Demonstrate the safe handling of refrigerant cylinders  
5.2 Demonstrate the safe transfer of refrigerant to or from a cylinder |
| 6. Be able to connect and disconnect a recovery set to and from the service ports of an automotive refrigerated cargo system containing fluorinated greenhouse gases | 6.1 Identify the type of refrigerant being used on a vehicle  
6.2 Locate and identify the automotive refrigerated cargo systems service ports  
6.3 Demonstrate the correct procedure for connecting and disconnection of the recovery set to and from the service ports of a automotive refrigerated cargo system |
| 7. Be able to operate a recovery set | 7.1 Demonstrate the correct operation of a recovery set |
CONTENT

1.1.1. The component parts of an automotive refrigerated cargo systems to include:
   a. compressor
   b. condenser
   c. receiver drier
   d. suction accumulator
   e. expansion valve
   f. Heat exchanger
   g. evaporator
   h. pipes and joints
   i. service valves
   j. sight glass
   k. solenoid valves

1.2.1. The operating principles of an automotive refrigerated cargo systems to include:
   a. heat transfer via:
      i. convection
      ii. conduction
      iii. radiation
   b. humidity including:
      i. saturation
      ii. condensation
      iii. relative humidity
   c. temperature:
      i. sensible heat
      ii. latent heat
      iii. difference between heat and temperature
   d. pressure:
      i. atmospheric
      ii. absolute
      iii. effect on boiling point
      iv. compression
      v. units of measurement
   e. refrigeration cycle
      i. compression
      ii. condensation
      iii. evaporation

2.1.1 The environmental issues relating to refrigerants to include:
   a. ozone layer and depletion
   b. Greenhouse effect
   c. Global warming potential
   d. Montreal protocol
   e. Kyoto agreement

2.2.1. Related legislation and regulations when carrying out operations on mobile air conditioning systems to include:
   a. EPA and effects of section 33 and 34 and legal disposal of waste
   b. COSHH
   c. waste transfer note
   d. all legal requirements relating to automotive refrigerated cargo systems
## CONTENT

### 2.3.1. Types, use and properties of fluorinated gases to include:
- **a.** properties
- **b.** characteristics
- **c.** R12 (CFC)
- **d.** R22
- **e.** R134a (HFC)
- **f.** R404
- **g.** R744 (CO₂)
- **h.** Hydrocarbons
- **i.** blends (drop-ins)
- **j.** risks (flammability)
- **k.** risks (fractionation)

### 2.4.1. Health risks associated with refrigeration systems and the appropriate Health and Safety measures to reduce these risks to include:
- **a.** PPE –fluoroelastomer gloves, protective goggles, safety boots, overalls
- **b.** contact with skin
- **c.** naked flame exposure
- **d.** smoking danger
- **e.** welding
- **f.** ventilation
- **g.** first aid

### 3.1.1 Basic knowledge of Regulations and Directives to include:
- **a.** Regulation (EC) No 842/2006
- **b.** Directive 2006/40/EC

### 4.1.1. Knowledge of recovery procedures to include:
- **a.** refrigerant specification and identification methods system recovery using appropriate equipment
- **b.** refrigerant state (liquid/vapour)
- **c.** gauges reading zero (atmospheric pressure) recovery equipment used in the procedure:
  - **i.** gauges
  - **ii.** lines and couplings
  - **iii.** recovery equipment
- **e.** how to select and check appropriate recovery cylinder to ensure fitness for use and determine the safe total and allowable filling weight
- **f.** methods of minimising refrigerant retention in oil
- **g.** methods which minimise the risk of refrigerant emission

### 5.1.1. The safe handling of refrigerant cylinders to include:
- **a.** storage
  - **i.** upright
  - **ii.** avoid heat sources including direct sunlight
  - **iii.** protection against frost
  - **iv.** accidental damage of valves
- **b.** transportation
  - **i.** upright
  - **ii.** labelling
  - **iii.** stacking
CONTENT

5.2.1. The transfer of refrigerant gas to or from a cylinder to include:
   a. cylinders may be within service station or standalone
   b. identify correct cylinder
   c. connections
      i. liquid and/or vapour connection
      ii. connect to correct port
   d. transfer of refrigerant
      i. correct state
      ii. minimum quantity transfer (200 grms)
   e. disconnection of recovery equipment

6.1.1. The identification of refrigerant to include:
   a. safe methods
   b. reference to vehicle specifications and using appropriate equipment

6.2.1. The location of automotive refrigeration cargo system service ports to include:
   a. confirm location of ports
   b. identify high and low pressure ports

6.3.1. The procedure for connecting and disconnection of the recovery set to and from the service ports of an automotive refrigerated cargo system to include:
   a. safely connect the recovery set
   b. safely disconnect the recovery set

7.1.1. The correct operation of a recovery set to include:
   a. selection of correct recovery equipment
   b. use the recovery equipment to carry out the full recovery of the F gas from an automotive refrigerated cargo system