



INSTITUTE
OF THE MOTOR
INDUSTRY

IMI QUALIFICATION



ASSESSMENT CRITERIA

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

I.D NO: 500/6771/0

Note: This guidance document is supported by a Candidate Practical Assessment and a Candidate Assessment Summary

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.

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CONTACT SHEET

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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:	
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**IMI Level 3 Award in Automotive Refrigerant Handling
(EC 842-2006)**

QCA I.D NO: 500/6771/0

Unit Ref:	Unit Title and ID Number	LH	Unit Level	Credit Value
AC1	Refrigerant Handling (EC 842-2006) K/600/3391	20	3	2



UNIT REF: AC1	UNIT TITLE: REFRIGERANT HANDLING (EC 842-2006)
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Level: 3	Route: Air Conditioning and Climate Control
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Credit Value: 2

Rationale: After July 2010 all individuals working on Mobile Air Conditioning (MAC) systems (for cars and car derived vans) 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 A/C systems in motor vehicles
2. Know about the use and properties of the fluorinated greenhouse gases used as refrigerants in A/C systems in motor 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)
3. Understand the relevant provisions of regulation (EC) No 842/2006 and Directive 2006/40/EC
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 a motor vehicle A/C system containing fluorinated greenhouse gases
7. Be able to operate a recovery set

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Know about the operation of A/C systems in motor vehicles	1.1 Identify the component parts of A/C systems 1.2 Describe operating principles of air conditioning systems
2. Know about the use and properties of the fluorinated greenhouse gases used as refrigerants in A/C systems in motor 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)	2.1 Outline the environmental issues relating to refrigerants 2.2 Explain related legislation and regulations when carrying out operations on mobile air conditioning systems 2.3 State the types, use and properties of fluorinated gases 2.4 Identify health risks associated with A/C systems and the appropriate health and safety measures to reduce these risks
3. Understand the relevant provisions of regulation (EC) No 842/2006 and Directive 2006/40/EC	3.1 Describe the main requirements of EC Regulation 842/2006 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 a motor vehicle A/C system containing fluorinated greenhouse gases	6.1 Identify the type of refrigerant being used on a vehicle 6.2 Locate and identify the A/C system service ports on a vehicle 6.3 Demonstrate the correct procedure for connecting and disconnection of the recovery set to and from the service ports of a motor vehicle
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 A/C systems to include:

- a. compressor
- b. condenser
- c. receiver drier
- d. suction accumulator
- e. expansion valve
- f. fixed orifice tube
- g. evaporator
- h. hoses

1.2.1. The operating principles of air conditioning 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 mobile air conditioning systems

CONTENT

2.3.1. Types, use and properties of fluorinated gases to include:

- a. properties
- b. characteristics
- c. R12 (CFC)
- d. R134a (HFC)
- e. R1234yf (HFO)
- f. Hydrocarbons
- g. blends (drop-ins)
- h. risks (flammability)
- i. risks (fractionation)

2.4.1. Health risks associated with A/C 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 (50 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 A/C system service ports to include:
- a. confirm location of ports
 - b. identify high and low pressure ports
 - c. identify ports used for different gas types
- 6.3.1. The procedure for connecting and disconnection of the recovery set to and from the service ports of a motor vehicle 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 a motor vehicle