

# Level 2 NVQ in Refrigeration and Air Conditioning

## Small Commercial Refrigeration and Air Conditioning Systems (6087-02)

National occupational standards units  
(Assessment and evidence requirements)



## **About City & Guilds**

City & Guilds is the UK's leading provider of vocational qualifications, offering over 500 awards across a wide range of industries, and progressing from entry level to the highest levels of professional achievement. With over 8500 centres in 100 countries, City & Guilds is recognised by employers worldwide for providing qualifications that offer proof of the skills they need to get the job done.

## **City & Guilds Group**

The City & Guilds Group includes City & Guilds, ILM (the Institute of Leadership & Management) which provides management qualifications, learning materials and membership services, NPTC which offers land-based qualifications and membership services, and HAB (the Hospitality Awarding Body). City & Guilds also manages the Engineering Council Examinations on behalf of the Engineering Council.

## **Equal opportunities**

City & Guilds fully supports the principle of equal opportunities and we are committed to satisfying this principle in all our activities and published material. A copy of our equal opportunities policy statement is available on the City & Guilds website.

## **Copyright**

The content of this document is, unless otherwise indicated, © The City and Guilds of London Institute 2008 and may not be copied, reproduced or distributed without prior written consent.

However, approved City & Guilds centres and learners studying for City & Guilds qualifications may photocopy this document free of charge and/or include a locked PDF version of it on centre intranets on the following conditions:

- centre staff may copy the material only for the purpose of teaching learners working towards a City & Guilds qualification, or for internal administration purposes
- learners may copy the material only for their own use when working towards a City & Guilds qualification

The *Standard Copying Conditions* on the City & Guilds website also apply.

Please note: National Occupational Standards are not © The City and Guilds of London Institute. Please check the conditions upon which they may be copied with the relevant Sector Skills Council.

## **Publications**

City & Guilds publications are available on the City & Guilds website or from our Customer Relations department at the address below or by telephoning +44 (0)20 7294 2850 or faxing +44 (0)20 7294 2405.

Every effort has been made to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time. City & Guilds cannot accept liability for loss or damage arising from the use of information in this publication.

## **City & Guilds**

**1 Giltspur Street**

**London EC1A 9DD**

**T +44 (0)20 7294 2800**

**F +44 (0)20 7294 2400**

**[www.cityandguilds.com](http://www.cityandguilds.com)**

**[centresupport@cityandguilds.com](mailto:centresupport@cityandguilds.com)**

# **Level 2 NVQ in Refrigeration and Air Conditioning**

## **6087-02 Small Commercial Refrigeration & Air Conditioning Systems**

**National occupational standards units  
(Assessment & evidence requirements)**

**Final Version November 2008**

***This page is intentionally blank***

<b>Contents</b>	<b>Page</b>
Foreword	4
Scheme Introduction	5
Entry Requirements	6
Directory Page	7
Scheme National Occupational Standards Units	9
<b>Level 3 NVQ Refrigeration and Air Conditioning Units</b>	
Unit 1 Maintain the safe working environment for HVACR activities	10
Unit 2 Maintain effective working relationships	23
Unit 3 Contribute to the improvement of business products and services for HVACR work activities	29
Unit 4 Plan RAC work activities	45
Unit 5 Commission and decommission RAC systems	51
Unit 6 Install RAC systems and components	67
Unit 7 Service and maintain RAC systems and components	81
Unit 8 Design RAC systems	99
Unit 9 Specify programmes for working RAC systems	112



## Foreword

This document provides details of the requirements specific to **Refrigeration and Air Conditioning NVQ** at Level 2 which includes

- the requirements for occupational competence for all those involved in assessing and verifying performance
- specific performance evidence and assessment requirements and
- the National Occupational Standards units

This document is designed and can be used in conjunction with:  
the *N/SVQ Candidate Guide* (stock reference TS-11-0001)  
and  
the *N/SVQ Centre Guide* (stock reference EN-11-0001)

Check the City & Guilds website: <http://www.cityandguilds.com>, for latest version.

Packs of multiple copies of the recording forms are also available from Publications Sales (Recording forms for N/SVQs, stock reference TS-22-0001).

In the case of any inconsistency between the *N/SVQ Centre Guide* or the *N/SVQ Candidate Guide* and this N/SVQ specific document, this document shall prevail.

For details of centre and scheme approval refer to the document: 'Providing City and Guilds qualifications' (stock code EN-00-1111) available free of charge from the Sales Department or your regional/national City & Guilds office (details in *Further information* section of this document).

Details of general regulations, registration and certification procedures, including fees, are included in the City & Guilds Directory of N/SVQ Awards. This information also appears on City & Guilds web site <http://www.cityandguilds.com>

## Level 2

### Refrigeration and Air Conditioning NVQ

#### 6087-02 Small commercial refrigeration & air conditioning systems

#### Introduction

This qualification has been developed using occupational standards produced for the mechanical services sector, and reflects the competence required to operate at craft level within the refrigeration and air conditioning industry.

It contains a single set of occupational standards. The range, evidence and assessment guidance identifies separate requirements for industrial and commercial, non-ammonia and air conditioning refrigeration systems. Candidates will be expected to demonstrate personal responsibility and to work with minimum supervision from drawings, specifications and schedules, and from oral or written instructions.

The non-routine aspects of the qualification involve:

- planning and organisation
- liaison with supporting trades, suppliers and customers
- solving problems and actioning solutions
- ensuring compliance with all relevant standards

The range of activities involved include:

- identifying customer requirements
- planning and programming work
- installing system components
- commissioning and decommissioning systems
- maintaining and servicing systems, including identification and rectification of faults

Health and safety, human interaction, quality control and environmental awareness requirements have also been included, but these can only be assessed from evidence produced while technical functions are being undertaken.

Candidates must present evidence of satisfactory assessment of their competencies in refrigerant handling and jointing of refrigeration pipework. *“They must also be able to identify relevant faults as either mechanical, electrical or electronic, carrying out fault rectification on electrical faults in interconnecting wiring and basic checks relating to fuse failures and loose or faulty connections of plug-in electronic components”.*

The difference between level 2 and level 3 qualifications lies principally in the depth of technical knowledge required and the level of responsibility.

- **level 2 candidates may need only demonstrate a fundamental knowledge of how components relate to each other within the system;**
- level 3 candidates must demonstrate detailed knowledge of systems and their operating principles. They should also be capable of planning, installing, commissioning, maintaining, servicing and decommissioning refrigeration and air conditioning systems.



## Entry Requirements

It is a requirement of the assessment strategy for this NVQ that candidates **can only** be registered upon this qualification if they are already registered on the City & Guilds Level 2 Certificate In Small Commercial Refrigeration and Air Conditioning Systems (6127-01) and that candidate certification for this qualification **must** be preceded by certification of the 6127-01.

## **Level 2 Small Commercial Refrigeration and Air Conditioning systems**

---

### **Mandatory Units**

Unit 1 Maintain the safe working environment for HVACR activities

Unit 2 Maintain effective working relationships

Unit 3 Contribute to the improvement of business products and  
Services for HVACR work activities

Unit 4 Plan RAC work activities

Unit 5 Commission and decommission RAC systems

### **Optional Units**

Unit 6 Install RAC systems and components

Unit 7 Service and maintain RAC systems and components

### **Additional Units**

Unit 8 Design RAC systems

Unit 9 Specify programmes for working on RAC systems

**6087 NVQ in Refrigeration and Air Conditioning Levels 2 & 3**

**6087**

**Mandatory Units**

- 001 Maintain the safe working environment for HVACR work activities
- 002 Maintain effective working relationships
- 003 Contribute to the improvement of business products and services for HVACR work activities
- 004 Plan RAC work activities
- 005 Commission and decommission RAC systems
- 006 Install RAC systems and components
- 007 Service and maintain RAC systems and components
- 008 Design RAC systems
- 009 Specify programmes for working on RAC systems
- 010 Plan **complex** RAC work activities
- 011 Commission and decommission **complex** RAC systems
- 012 Install **complex** RAC systems and components
- 013 Service and maintain **complex** RAC systems and components
- 014 Design **complex** RAC systems
- 015 Specify programmes for working on **complex** RAC systems

<b>NVQs in Refrigeration and Air Conditioning</b>		
<b>Level 2</b>		<b>Industrial Pathway Route Evidence Indicator-IPREI</b>
6087-02 <b>Small Commercial Refrigeration &amp; Air Conditioning Systems</b>	001, 002, 003, 004, 005 and 006 or 007 008, 009 additional units	201-Installation 202-Service and Maintenance
<b>Level 3</b>		<b>Industrial Pathway Route Evidence Indicator-IPREI</b>
6087-03 <b>Commercial &amp; Industrial Air Conditioning Systems</b>	001, 002, 003, 010, 011 and 012 or 013 014, 015 additional units	301-Installation 302-Service and Maintenance
6087-04 <b>Ammonia Refrigeration Systems</b>	001, 002, 003, 010, 011 and 012 or 013 014, 015 additional units	303-Installation 304-Service and Maintenance
6087-05 <b>Commercial &amp; Industrial Refrigeration Systems Non Ammonia</b>	001, 002, 003, 010, 011 and 012 or 013 014, 015 additional units	305-Installation 306-Service and Maintenance

# Level 2

## Refrigeration & Air Conditioning

### National Occupational Units

## Small commercial refrigeration and air conditioning systems

#### **Mandatory Units**

- Unit 1 Maintain the safe working environment for HVACR activities
- Unit 2 Maintain effective working relationships
- Unit 3 Contribute to the improvement of business products and Services for HVACR work activities
- Unit 4 Plan RAC work activities
- Unit 5 Commission and decommission RAC systems

#### **Optional Units**

- Unit 6 Install RAC systems and components
- Unit 7 Service and maintain RAC systems and components

#### **Additional Units**

- Unit 8 Design RAC systems
- Unit 9 Specify programmes for working on RAC systems

#### ***Unit content sequence order:***

- Title***
- Elements***
- Unit commentary***
- Performance criteria***
- Range***
- Performance evidence***
- Knowledge statements***
- Assessment Guidance***

**Note:**            ***This is what the candidate must do:***

**Unit 001**        **Maintain the safe working environment for HVACR work activities**  
***This involves being able to:***

Element 1.1    Use safe procedures when working with others

Element 1.2    Use safe working practices

---

### **Unit Commentary**

- This unit is the same across all HVACR Level 2 and 3 Units. Evidence gathering opportunities to satisfy the criteria will occur whilst working towards achievement of the technical units. Some safety critical aspects of the technical units may not be achievable through the workplace. For these situations, simulation in a realistic work environment is acceptable.
- The unit covers 'core' health and safety requirements. These requirements apply to Level 2 and 3. Health and safety differences specific to individual disciplines and levels are incorporated within the relevant technical units.
- This unit deals with the candidate's ability to work in a safe manner for the well being of themselves and others who may be affected by the actions or omissions of the candidate.
- Candidates must be capable of making a positive contribution to safety on an ongoing basis and be able to respond effectively in the event of an emergency situation arising.
- A knowledge of safety information, practice and procedures is required, as well as the ability to communicate relevant information to others, for example; colleagues, other workers, customers and occupants of buildings.
- Be able to operate safely within and monitor agreed safety related agreements regarding potential hazards, correct use of relevant personal protective equipment and observing and following the requirements of safety information.
- Limit injury to persons or damage to property in the event of an accident or emergency. This covers basic safety procedures and damage reporting requirements. Fire, explosion or toxic atmospheres within the workplace, requires candidates to demonstrate the effective summoning of appropriate emergency services and procedures to adopt in the event of such emergencies.
- There are many potential hazards within our industry. This unit is designed to ensure that candidates who meet its requirements are aware of the potential dangers, likely hazards and where to source; safety information, appropriate regulations and apply them to the workplace and the people who operate within it.

**Unit 001**                      **Maintain the safe working environment for HVACR work activities**

Element 1.1                      Use safe procedures when working with others

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

**1.1.1 Comply with** health and safety legislation <sup>(1)</sup> **when working with** other persons<sup>(2)</sup>

**1.1.2 Take** precautionary actions <sup>(3)</sup> **to minimise the potential safety risk to persons in the** work location <sup>(4)</sup>

*Candidates will be required to produce evidence for all range items.*

## **Range**

### **1. Health and Safety Legislation**

- a. Health and Safety at Work, etc. Act
- b. Construction (Health, Safety and Welfare) Regulations 1961
- c. Construction (Lifting Operations) Regulations 1961
- d. Electricity At Work Regulations 1989
- e. Control of Substances Hazardous to Health Regulations (COSHH)
- f. Manual Handling Regulations 1992
- g. Employer's responsibility under Health and Safety at Work Act
- h. Employee's responsibility under Health and Safety at Work Act
- i. How safety regulations affect your work
- j. General safety measures
  - Site inspections
  - Risk assessments
  - Danger of slips, trips or falls
  - Danger of falling objects

### **2. Other Persons**

- a. Customers
- b. Colleagues – own trade
- c. Colleagues – other trades
- d. Site officials
  - Site management
  - Statutory inspections
- e. Visitors
  - Authorised
  - Unauthorised

### **3. Precautionary Actions**

- a. Provision of PPE
- b. Safety signs and notices
- c. Follow accident prevention methods
- d. Protection of workforce and public
- e. Working on drains and sanitary appliances
- f. Working with LPG and welding equipment
- g. Personal hygiene
- h. First aid facilities
- i. Fire fighting equipment
- j. Access route and equipment
- k. Manual handling and lifting
- l. Actions in an emergency

#### **4. Working Location**

- a. New buildings
- b. Occupied buildings
- c. Service and maintenance workplaces
- d. Working at heights
- e. Excavations and confined spaces
- f. Scaffolding
- g. Vehicles



## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

- |    |   |                 |
|----|---|-----------------|
| 1. | Follow current regulations, recommendations and guidelines for health and safety protection of self and others.<br>(PC 1.1.1) | (Range All)     |
| 2. | Check the work location layout and structure is safe for work to proceed<br>(PC 1.1.1, 1.1.2)                                 | (Range 1, 2, 3) |
| 3. | Alert visitors to potential hazards<br>(PC 1.1.2)   | (Range 3, 4)    |
| 4. | Respond promptly and appropriately to accidents involving injury to others<br>(PC 1.1.2)                                      | (Range 3, 4)    |
| 5. | Summon emergency services<br>(PC 1.1.2)   | (Range 3, 4)    |
| 6. | Take the appropriate actions in the event of:<br>- fire<br>- emergency working<br>(PC 1.1.2)                                  | (Range 3, 4)    |

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range.

## Knowledge Statements

*The candidate must provide evidence that they know:*

- |    |   |              |
|----|---|--------------|
| 1. | The general responsibilities of the employer and employee for ensuring safety in the work place<br>(PC 1.1.1)   | (Range 1, 2) |
| 2. | The requirements of safety legislation for the range of work operations<br>(PC 1.1.1)   | (Range 1)    |
| 3. | The potential hazards or risks associated with the range of work locations in which work on systems is undertaken, and the measures to be taken to reduce risk.<br>(PC 1.1.2)                                 | (Range 3, 4) |
| 4. | General measures to be taken to create safety awareness, company on-site policies, applying and supervising site safety practices, including measures to report potential safety hazards<br>(PC 1.1.1, 1.1.2) | (Range All)  |
| 5. | Accident reporting procedures<br>- Basic first aid procedures<br>(PC 1.1.1, 1.1.2)  | (Range: All) |
| 6. | The procedures for summoning the different emergency services. The information required by the emergency services to permit them to respond promptly.<br>(PC 1.1.2)   | (Range 3, 4) |
| 7. | The range of fire extinguishers used for different types of fire and how to extinguish small fires in a safe manner.<br>(PC 1.1.2)  | (Range 3, 4) |
| 8. | Typical evacuation procedures for work locations in which system installation or maintenance work is to be carried out.<br>(PC 1.1.2)   | (Range 3, 4) |

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Comply with Health and Safety requirements at all times.
  - b. Take the appropriate precautionary actions to ensure safe working
  - c. Act appropriately in the event of an emergency.
  - d. Undertake the correct procedures for basic first aid and reporting of accidents.
  - e. Demonstrate in a simulated situation the ability to:
    - i) select fire extinguishing equipment appropriate to a specified fire source
    - ii) correctly apply fire fighting equipment
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Unit 001                      Maintain the safe working environment for HVACR work activities**

Element 1.2                      Use safe working practices

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 1.2.1    Work to the procedures laid down in risk assessments <sup>(1)</sup>**
- 1.2.2    Take remedial action(s) where work methods do not comply with risk assessment <sup>(1)</sup> requirements**
- 1.2.3    Use tools and equipment <sup>(2)</sup> in a manner which complies with health and safety requirements**
- 1.2.4    Maintain tools and equipment <sup>(2)</sup> to a standard which meets health and safety requirements**
- 1.2.5    Demonstrate work processes which comply with health and risk assessment <sup>(1)</sup> safety requirements**
- 1.2.6    Handle potentially hazardous materials <sup>(3)</sup> in a manner, which complies with health and safety requirements**
- 1.2.7    Take precautionary actions <sup>(4)</sup> during work activities to ensure the safety of customer's property <sup>(5)</sup>**
- 1.2.8    Comply with hazard warning and prohibition notices <sup>(6)</sup>**

*Candidates will be required to produce evidence for all range items.*

## **Range**

### **1. Risk Assessments**

- a. Identifying risks
- b. Risk factors
- c. Risk exposure
- d. Safeguard hardware
- e. Control measures
- f. Assessment forms
- g. Risk assessment associated with:
  - Work locations
  - Tools and equipment
  - Hazardous materials
  - Hazardous processes

### **2. Tools and Equipment**

- a. Hand tools
- b. Power operated tools
- c. Test equipment
- d. Access equipment
- e. Personal protective equipment
- f. Plant
- g. Lifting devices
- h. Movable equipment

### **3. Potentially Hazardous Materials**

- a. Compressed gasses
- b. Cleaning agents
- c. Solvents
- d. Asbestos based products
- e. By-products from working processes
- f. Electricity

### **4. Precautionary Actions**

- a. Use of PPE
- b. Safety signs and notices
- c. Follow accident prevention methods
- d. Protection of others
- e. Personal hygiene
- f. Location of first aid facilities
- g. Location of fire fighting equipment
- h. Access routes and equipment
- i. Manual handling and lifting

**5. Customer's Property**

- a. External building surfaces
- b. Internal building surfaces
- c. Building contents

**6. Hazardous Warning and Prohibition Notices**

- a. Fire fighting signs
- b. Rescue equipment signs
- c. Emergency exit signs
- d. Prohibition signs
- e. Warning signs
- f. Mandatory signs
- g. Safe condition signs

## Performance Evidence

Candidates must produce sufficient evidence to demonstrate consistency in their ability to:	
1.	Use approved, safe methods and techniques when lifting heavy or bulky items (PC 1.2.6) (Range 3)
2.	Identify damage to property and minimise the risk of further damage (PC 1.2.7) (Range 4, 5)
3.	Use safe working procedures to safeguard persons and property in the workplace, including working to procedures laid down in risk assessments. (PC All) (Range All)
4.	Monitor safety procedures and take remedial action where potential hazards are identified (PC 1.2.2) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range.

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. How to work to, or produce general risk assessments and how to apply them in the workplace  
(PC 1.2.1) (Range 1)
2. Safe practices when carrying out work on systems and components  
(PC All) (Range All)
3. The range of tools and equipment for installation or maintenance work, their safe use, maintenance requirements and selection of appropriate safety equipment  
(PC 1.2.3, 1.2.4) (Range 2)
4. The range of tools and equipment whose use is controlled by legislation  
(PC 1.2.3, 1.2.4) (Range 2)
5. The range of potential hazardous materials used for system installation or maintenance work.  
(PC 1.2.6) (Range 3)
6. The methods of identifying potentially hazardous materials and level of risk, including asbestos  
(PC 1.2.1, 1.2.6) (Range 1, 3)
7. Safety precautions including the use of personal protective equipment  
(PC All) (Range All)
8. The legislation or recommendations governing the safe use or disposal of hazardous materials.  
(PC 1.2.6) (Range 3)
9. The methods of protecting customer's property within the types of locations in which system installation or maintenance work is carried out  
(PC 1.2.7) (Range 4, 5)
10. How to liaise with the customer, pre-work inspection, reporting existing damage or identifying damage arising from work operations  
(PC 1.2.7) (Range 4, 5)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range



## Assessment Guidance

To assist in assessment of candidates

1. Performance evidence should be generated from the workplace. All performance evidence must be of a commercially acceptable standard.
2. Candidates must follow correct procedures to:
  - a. make safe the range of hazards listed
  - b. conform to company and customer safety requirements
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Note:**            ***This is what the candidate must do:***

**Unit 002**        **Maintain effective working relationships**  
***This involves being able to:***

Element 2.1    Establish, maintain and develop effective working relationships with others

---

### **Unit Commentary**

- This unit is the same across all Level 2 disciplines. Evidence gathering opportunities to satisfy the criteria will occur whilst working towards the achievement of the technical units
- The unit covers 'core' working relationships. The requirements apply across all the Occupational Standards at Level 2 disciplines. Differences in levels of responsibility within working relationship specific to individual Occupational Standards are incorporated within the relevant technical units.
- This unit deals with the candidate's ability to work in harmony with other people for the benefit of themselves and their employer/employee' organisation.
- Candidates must be capable of starting off and developing effective work relationships. They must know the most effective means of doing so and also understand why this is important to themselves and their employer.
- In the case of 'other persons', candidates should be capable of obtaining sufficient details before commencing work to provide a sound basis to establish and develop good customer relations. Candidates should also be able to provide relevant information, respond positively and promptly, know how to deal with different types of customer and realise why the individual has such an important role to play in the success of an organisation.
- When dealing with site visitors, it is vital that candidates know the range of possible visitors they can expect to encounter and the way in which they should be treated. The ability to confirm identification, and the reason why this should be done as well as the ability to deal with requests for information in the correct manner.
- Colleagues may include line managers, peers, customers and fellow workers. Occupants of premises where work is being undertaken are also included and the candidate should understand why good relations with colleagues are important to both the customer and to their employer. Candidates are required to provide information and some support to new colleagues and those who experience work difficulties.

**Unit 002                      Maintain effective working relationships**

Element 2.1                      Establish, maintain and develop effective working relationships with others

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 2.1.1 Identify other persons <sup>(1)</sup> within the work location that are essential to the development of an effective working relationship.**
- 2.1.2 Respond effectively to requests for job information <sup>(2)</sup> from others in the workplace.**
- 2.1.3 Use a range of methods of communication <sup>(3)</sup> to pass job information <sup>(2)</sup> to others in the workplace**
- 2.1.4 Develop and maintain effective working relationships with other persons <sup>(1)</sup> in the workplace.**

*Candidates will be required to produce evidence for all range items.*

## **Range**

### **1. Other Persons**

- a. Customers
- b. Any worker within work location
- c. Visitors to work location
- d. Colleagues

### **2. Job Information**

- a. Specifications
- b. Drawings
- c. Statutory regulations and recommendations
- d. Instructions – verbal or written

### **3. Methods of Communication**

- a. Oral
- b. Written
- c. Information Communication Technology

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Obtain and record details of customer, customer's representative or co-contractor.  
(PC 2.1.1) (Range 1)
2. Treat other persons within the work location in a manner conducive to the establishment of good relationships.  
(PC 2.1.4) (Range 1)
3. Provide information through a range of methods to meet the requirements of others in the workplace.  
(PC 2.1.2, 2.1.3) (Range All)
4. Respond promptly and willingly to reasonable requests from other persons within the work location.  
(PC 2.1.2, 2.1.4) (Range 1)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range.

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The range of other persons encountered within the work location with whom it may be necessary to establish working relationships.  
(PC 2.1.1) (Range 1)
2. The types of management structures within different organisations employing MES labour, and the roles and responsibilities of the different individuals within these structures.  
(PC 2.1.1) (Range 1)
3. What other persons expect from a good working relationship.  
(PC 2.1.4) (Range 1)
4. The types of job information that may be requested by others in the workplace, e.g.: sources of information, methods of accessing information and possible restrictions on passing information to others.  
(PC 2.1.2, 2.1.3) (Range 2, 3)
5. The methods of communication used for the range of job or company information best suited to its purpose.  
(PC 2.1.3) (Range 2, 3)
6. How to use the key principles of good communication in work situations, including methods of confirming that the communication has been understood.  
(PC 2.1.3) (Range 2, 3)
7. The actions that are necessary to begin, develop and maintain good working relationships.  
(PC 2.1.4) (Range 1)
8. The principles of good working relationships and reasons why working relationships may break down.  
(PC 2.1.4) (Range 1)
9. The actions to take to restore working relationships where a breakdown occurs.  
(PC 2.1.4) (Range 1)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and Range

## Assessment Guidance

### To assist in assessment of candidates

1. Performance evidence should be generated from the workplace. All performance evidence must be of a commercially acceptable standard.
2. Candidates must undertake across the listed range:
  - a. negotiation, discussion and explanation
  - b. face-to-face and telephone conversation
  - c. provision of effective written communication
3. Candidates must:
  - a. ascertain visitors authority using the range of visitor details and information listed
  - b. provide appropriate and relevant information to requests, in line with organisational procedures

**Note:**            *This is what the candidate must do:*

**Unit 003**        **Contribute to the improvement of business products and services for HVACR work activities**  
*This involves being able to:*

Element 3.1    Promote the image of the business to others  
Element 3.2    Identify and recommend opportunities for improving customer care  
Element 3.3    Demonstrate environmental awareness within the workplace

---

### **Unit Commentary**

- This unit is the same across all Level 2 disciplines. Evidence gathering opportunities to satisfy the criteria will occur whilst working towards achievement of the technical units.
- The unit covers the 'core' requirements of business improvement that apply to all the Occupational disciplines at Levels 2. Quality improvement differences specific to individual Occupational Standards and levels are incorporated within the relevant technical units.
- This unit deals with the candidate's ability to present a positive image of the organisation and industry and be able to identify and make recommendations regarding improvements to; products, services and procedures.
- It is important to present the organisation and industry's image by being positive about the work carried out and that personal presentation and general manner gives a good impression to customers and co-contractors.
- Candidates are required to consider the methods they use when undertaking work activities and seek to improve the quality of products, services and organisational procedures. They are also expected to feed back recommendations to relevant persons and be aware of customer expectations regarding the service they, and their organisation provide.
- A prime requirement of this unit is the demonstration of environmental awareness in the workplace. Working methods that make effective and economical use of materials and energy and the ability to work with hazardous materials, employing sound work practices are essential to safeguarding the environment.



**Unit 003**

**Contribute to the improvement of business products and services for HVACR work activities**

Element 3.1

Promote the image of the business to others

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 3.1.1 Ensure personal presentation provides a positive image of the business to other persons <sup>(2)</sup>.**
- 3.1.2 Ensure that the job information <sup>(1)</sup> provided meets the needs of other persons <sup>(2)</sup> in the workplace.**
- 3.1.3 Present job information <sup>(1)</sup> in ways, which encourage a positive image of the business.**
- 3.1.4 Recognise and act on opportunities for promoting the services of the business to other persons <sup>(2)</sup>.**

*Candidates will be required to produce evidence for all range items.*

## **Range**

### **1. Job Information**

- a. Specifications
- b. Drawings
- c. Statutory regulations and recommendations
- d. Instructions – verbal or written

### **2. Other Persons**

- a. Customers
- c. Any worker within work location
- d. Work location visitors
- e. Colleagues

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Promote industry/organisation in a positive way.  
(PC All)

(Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range.

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The importance of correct personal presentation, e.g.: clothing worn and manner.  
(PC 3.1.1, 3.1.4) (Range All)
2. The type of actions that will promote the business that are within the candidate's daily routine  
(PC 3.1.2, 3.1.3, 3.1.4) (Range 1, 2)
3. The types of action that produce positive and negative responses  
(PC 3.1.2, 3.1.3) (Range 1, 2)
4. The range of promotional information appropriate to different work situations and how to ensure the information provided is appropriate to its intended use.  
(PC 3.1.2) (Range 1, 2)
5. The methods of presenting information that are appropriate to the situation or the person requesting the information.  
(PC 3.1.4) (Range 1)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Present verbal and written information to personnel within the range
  - b. Demonstrate the desired standard of personal presentation
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Unit 003**                      **Contribute to the improvement of business products and services for HVACR work activities**

Element 3.2                      Identify and recommend opportunities for improving customer care

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 3.2.1 Identify opportunities for improving customer care and enhancing business procedures<sup>(2)</sup>.**
- 3.2.2 Take actions to rectify problems with business procedures<sup>(2)</sup>.**
- 3.2.3 Take actions to address customer complaints on system or component<sup>(1)</sup> operation.**
- 3.2.4 Report to job supervisor or line manager potential opportunities for improving business procedures<sup>(2)</sup>.**

*Candidates will be required to produce evidence for all range items.*

## **Range**

### **1. Systems or Components**

- a. Systems
- b. Appliances
- c. Materials
- d. Controls

### **2. Business Procedures**

- a. Customer service
- b. Internal and external communication
- c. Business administration
- d. Efficient use of resources

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Identify source of customer expectation shortcomings and product variance, formulate and produce a solution.  
(PC All) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range.



## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The typical formal and informal approaches to ensuring good customer service.  
(PC 3.2.1) (Range 2)
2. The typical details contained in written statements of customer service policy.  
(PC 3.2.1) (Range 2)
3. The work actions necessary to support the business's customer service policy.  
(PC 3.2.2) (Range 2)
4. The checks to be carried out during work activities to ensure customer satisfaction with the service provided, and the measures to be taken where deficiencies in customer service are identified.  
(PC 3.2.2, 3.2.3) (Range 1, 2)
5. The actions necessary to record and report any deficiencies in the performance of systems or components.  
(PC 3.2.4) (Range 2)
6. The methods of dealing with customer complaints arising from dissatisfaction with work standards or attitude of the workforce.  
(PC 3.2.1, 3.2.2, 3.2.3, 3.2.4) (Range 1, 2)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Identify shortcomings and present solutions to rectify them to personnel listed
  - b. Provide verbal and written communications regarding customer services expectations
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Unit 003**                    **Contribute to the improvement of business products and services for HVACR work activities**

Element 3.3                Demonstrate environmental awareness within the workplace

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 3.3.1 Apply environmentally friendly work procedures when working on systems or components<sup>(1)</sup>**
- 3.3.2 Refer to immediate job supervisor or line manager systems or component<sup>(1)</sup> factors that may damage the environment.**
- 3.3.3 Ensure that customers are advised of all systems or component<sup>(1)</sup> operating procedures that are intended to protect the environment.**

*Candidates will be required to produce evidence for all range items.*

## **Range**

### **1. Systems or Components**

- a. Systems
- b. Appliances
- c. Materials
- d. Controls

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Undertake work in a manner which takes account of:
  - a. Effective and economic use of materials
  - b. Working methods which are not harmful to the environment
  - c. Minimising wastage of materials and environmental damage
  - d. Observing principles of energy efficiency

(PC All) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range.

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The potential implications for the environment of the work procedures used in installing or maintaining systems or components.  
(PC 3.3.1) (Range All)
2. Alternative 'low risk' materials, products and procedures.  
(PC 3.3.1) (Range All)
3. Prefabrication, installation and maintenance methods that reduce material wastage.  
(PC 3.3.1) (Range All)
4. The importance of reporting hazards that may damage the environment that can arise from work procedures and of confirming that appropriate action has taken place.  
(PC 3.3.2) (Range All)
5. The range of information that needs to be passed to the customer to ensure the correct and economic use of energy dependant systems.  
(PC 3.3.3) (Range All)
6. The general advice that can be given to customers on methods of reducing waste of resources and effective savings.  
(PC 3.3.3) (Range All)
7. The disposal methods to be used for waste materials.  
(PC 3.3.1) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

*To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. All performance evidence must be of a commercially acceptable standard.
2. Candidates must demonstrate planning and execution of work in line with good environmental practices.
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Note:**            *This is what the candidate must do:*

**Unit 004**        **Plan RAC work activities**  
                      **-Small commercial refrigeration and air conditioning systems**  
                      ***This involves being able to:***

Element 4.1    Plan the work activities to be carried out

---

### **Unit Commentary**

- This unit measures the candidate's ability to undertake the planning activities prior to and during the installation or service and maintenance process on small commercial refrigeration and air conditioning systems
- Candidates are required to apply their skills and knowledge in a wide variety of work activities including those that are complex and those that are non-routine. They must be able to make decisions within their sphere of responsibility
- Candidates will be capable of collaborative working to achieve common objectives
- They need to identify what needs to be done and how best to undertake the identified tasks within the various situations, circumstances and surroundings that candidates will have to work in.
- Candidates are required to specify what they need in terms of tools, materials and equipment, in order to carry out the required work at various stages in the work programme.
- It is important that candidates can organise work activities into a logical sequence and be able to produce and alter programmes as circumstances dictate.



**Unit 004**                      **Plan RAC work activities**  
**-Small commercial refrigeration and air conditioning**  
**systems**

Element 4.1                      Plan the work activities to be carried out

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 4.1.1 Ensure that all job information <sup>(1)</sup> essential for the correct installation or service and maintenance activity required on the system or components <sup>(2)</sup> is available.**
- 4.1.2 Identify from job information <sup>(1)</sup> the key features of the system or components <sup>(2)</sup>.**
- 4.1.3 Confirm compliance of the proposed installation or service and maintenance activities with industry requirements <sup>(3)</sup>.**
- 4.1.4 Confirm that the building structure <sup>(4)</sup> is suitable to accommodate the system or components <sup>(2)</sup>.**
- 4.1.5 Identify from job information <sup>(1)</sup> the point(s) within the installation or service and maintenance process where liaison with other persons <sup>(5)</sup> will be necessary.**
- 4.1.6 Obtain customer approval of any proposed deviation from the original system or component specification.**
- 4.1.7 Monitor the progress of the job against the work schedules <sup>(6)</sup>.**
- 4.1.8 Agree revisions to work programmes with other persons <sup>(5)</sup> where modifications and deviations prove necessary.**

*Candidates will be required to produce evidence for all range items*

## **Range**

### **1. Job Information**

- a. Specifications
- b. Drawings
- c. Statutory regulations and recommendations
- d. Instructions – verbal or written

### **2. System or Components**

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for Systems Within the Range
  - Mechanical, electrical and electronic components and controls for appropriate systems.
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### **3. Industry Requirements**

- a. Statutory regulations and recommendations
- b. Safety legislation governing activities in the workplace
- c. Specifications
- d. Company procedures
- e. BS EN 378

### **4. Building Structure**

- a. Method of construction and materials used
- b. Performance requirements of system components (vibration, heat transfer)
- c. Availability of input service
  - electrical
  - water
  - drainage

### **5. Other Persons**

- a. Customers
- b. Other workers
- c. Public

### **6. Work Schedules**

- a. Verbal instructions
- b. Written instructions

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Confirm that all necessary job information essential to the correct installation or service and maintenance of the system or components is on site before job commencement.  
(PC 4.1.1) (Range 1, 2)
2. Identify the installation or service and maintenance requirements from the information listed and determine the most appropriate approach to undertake the work, in accordance with industry requirements.  
(PC 4.1.2, 4.1.3) (Range 1, 2, 3)
3. Confirm that the building structure is suited to the proposed activity.  
(PC 4.1.4) (Range 2, 4)
4. Identify when liaison with other people will be necessary during the installation or service and maintenance activity.  
(PC 4.1.5) (Range 1, 5)
5. Produce and agree installation/work programmes with the appropriate people and advise them of any anticipated or actual deviations or variations.  
(PC 4.1.6, 4.1.7, 4.1.8) (Range 5)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The system types and their intended functions, system components and layouts.  
(PC 4.1.2) (Range 1, 2)
2. The regulations governing system design, installation or service and maintenance activity and operation.  
(PC 4.1.3) (Range 3)
3. The main construction features of buildings into which the systems are installed.  
(PC 4.1.4) (Range 2, 4)
4. The sources of information on the design of specific systems, plans and drawings, specifications.  
(PC 4.1.1, 4.1.5) (Range 1, 2)
5. The installation or service and maintenance requirements for systems, including routine liaison with others in the overall programme (including the customer).  
(PC 4.1.5) (Range 1, 5)
6. How to obtain detail from installation programmes or service and maintenance schedules and how to monitor progress against the programme.  
(PC 4.1.7) (Range 1)
7. How to negotiate variations to work programmes and the need to obtain written acceptance to major work or materials variations.  
(PC 4.1.6, 4.1.8) (Range 1, 5)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Produce evidence from a minimum of two work locations, incorporating a significant proportion of the installation.
  - b. Demonstrate a clear understanding of how to deal with situations which do not go according to plan.
  - c. Provide evidence which may include sketches, material and equipment lists, timesheets and diary entries.
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Note:**            *This is what the candidate must do:*

**Unit 005**        **Commission and de-commission RAC systems**  
**-small commercial refrigeration and air conditioning systems**  
***This involves being able to:***

Element 5.1    Carry out pre-commission checks and tests on systems  
Element 5.2    Commission systems  
Element 5.3    De-commission systems

---

### **Unit Commentary**

- This unit measures the candidate's ability to undertake the various checks and tests necessary before the system is brought into operation. It also involves bringing the system into operation and ensuring it operates effectively as intended. Candidates are also required to de-commission the system, ready for further work or long-term isolation. This could involve the removal and disposal of system fluids and components
- Candidates are required to apply their skills and knowledge in a wide variety of work activities including those that are complex and those that are non-routine. They must also be able to make decisions within their sphere of responsibility
- Candidates will be capable of collaborative working to achieve common objectives
- Candidates are required to check that components are installed correctly and that the system is functioning within its operational limits. Further, they should leave the work location tidy. Additionally, they should be capable of rectifying faults, within their range of responsibility. This includes identifying relevant faults as mechanical, electrical or electronic and carrying out basic checks relating to fuse failure and loose or faulty connections of plug-in electronic components.
- For decommissioning, candidates are required to make arrangements with those responsible for the work location, for the safe recovery and disposal of system fluids and components.
- It is important that candidates are aware of the effect isolating part of a system has on the full system.

**Unit 005**

**Commission and de-commission RAC systems  
-small commercial refrigeration and air conditioning  
systems**

Element 5.1

Carry out pre-commissioning checks and tests on systems

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 5.1.1 **Confirm that the** system or component <sup>(1)</sup> **installation complies** with industry requirements <sup>(2)</sup>.
- 5.1.2 **Check that** input services <sup>(3)</sup> **to the** system or component <sup>(1)</sup> **are suited to their intended purpose.**
- 5.1.3 **Check** systems or component <sup>(1)</sup> **for soundness using procedures that comply with** industry requirements <sup>(2)</sup>.
- 5.1.4 **Carry out** pre-commissioning tests and checks <sup>(4)</sup> **in accordance with** industry requirements <sup>(2)</sup>.
- 5.1.5 **Carry out strength and pressure testing, evacuation and dehydration and refrigerant and lubricant draining in compliance with** industry requirements <sup>(2)</sup>.

*Candidates will be required to produce evidence for all range items*

## **Range**

### **1. Systems or Components**

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for Systems Within the Range
  - Mechanical, electrical and electronic components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### **2. Industry Requirements**

- a. statutory regulations and recommendations
- b. Safety legislation governing activities in the workplace
- c. Work sequences
- d. Co-ordination with the work of others
- e. Work practices and techniques for commissioning systems or components
- f. Company procedures
- g. In accordance with industry's expectations of
  - Air conditioning engineer
  - Refrigeration engineer
- h. BS EN378
- i. Manufacturer's recommendations

### **3. Input Services**

- a. Existing systems
- b. Fuel, water, electricity and drainage

### **4. Pre-commissioning Tests and Checks**

- a. Component function
- b. System integrity
  - electrical
  - leak tight



## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Apply approved procedures to:
  - i) Pressure test the system
  - ii) Evacuate the system
  - iii) Charge the system(PC 5.1.1, 5.1.3, 5.1.4, 5.1.5) (Range 1, 2, 4)
  
2. Carry out preliminary checks to ensure the components function.  
(PC 5.1.1, 5.1.2, 5.1.3) (Range 1, 2, 3)
  
3. Inspect and test the system:
  - i) To ensure components are positioned correctly
  - ii) For leakage(PC 5.1.1, 5.1.3, 5.1.4) (Range 1, 2, 4)
  
4. Confirm that electrical power and control systems are safe for loading via the correct authority.  
(PC 5.1.2) (Range 1, 3)
  
5. Ensure that all faults found in the system are rectified.  
(PC 5.1.1, 5.1.4) (Range 1, 2, 4)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range.

## Knowledge Statements

*The candidate must provide evidence that they know:*

- |    |  |                 |
|----|--|-----------------|
| 1. | The procedures, equipment and legislative requirements for applying soundness tests to systems.<br>(PC 5.1.3)                | (Range 1, 2)    |
| 2. | The methods of establishing that input services adequately supply all components within the system.<br>(PC 5.1.2)            | (Range 1, 3)    |
| 3. | The methods of connecting components to systems.<br>(PC 5.1.1)   | (Range 1, 2)    |
| 4. | The actions to take when pre-commissioning checks or tests reveal system or component defects.<br>(PC 5.1.1, 5.1.4)          | (Range 1, 2, 4) |
| 5. | How to complete pre-commissioning documentation confirming the safe pre-commissioning of systems and components.<br>(PC All) | (Range All)     |

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

*To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Check and inspect:
    - Pipework and conduit (steel, copper, plastic)
    - Brackets and supports
    - Heat exchange devices
    - Compressor sets and packs
    - Controls (mechanical)
    - Controls (electrical) from the appropriate supply
    - Pressure vessels
    - Prefabricated items
  - b. Carry out procedures for:
    - Pressure testing the system
    - Evacuating the system
    - Charging the system
  - c. Carry out (a) and (b) on at least three occasions within one, and preferably more, of the appropriate systems:
    - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
    - System capable of reverse cycle heat pumping and/or forced defrost
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Unit 005**                      **Commission and de-commission RAC systems  
-small commercial refrigeration and air conditioning  
systems**

Element 5.2                      Commission Systems

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 5.2.1 **Ensure that the necessary** information <sup>(1)</sup> **on the** system or component <sup>(2)</sup> **performance is available.**
- 5.2.2 **Liaise with** other persons <sup>(3)</sup> **at appropriate points within the commissioning process to minimise disturbance to work routines.**
- 5.2.3 **Check the correct function of** systems and components <sup>(1)</sup> **against performance requirements.**
- 5.2.4 **Adjust** system controls <sup>(4)</sup> **to establish** system or components <sup>(2)</sup> **meet the design specification.**
- 5.2.5 **Provide the customer with the** information <sup>(1)</sup> **necessary to ensure the continuing operation of the system or component.**

*Candidates will be required to produce evidence for all range items*

## **Range**

### **1. Information**

- a. Commissioning specification
- b. Manufacturers specification
- c. Installation specification
- d. Test records and certificates
- e. User information

### **2. Systems or Components**

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for systems within the Range:
  - Mechanical, electrical and electronic components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### **3. Other Persons**

- a. Customers
- b. Other workers
- c. Public

### **4. System Controls**

- a. Mechanical
- b. Electrical
- c. Electronic

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

- |    |   |                 |
|----|---|-----------------|
| 1. | Complete appropriate documentation.<br>(PC 5.2.1, 5.2.5)  | (Range 1, 2)    |
| 2. | Confirming that appropriate persons have been notified of commissioning activities in order to minimise disturbance to work routines.<br>(PC 5.2.2) | (Range 3)       |
| 3. | Bring the system into operation and confirm that systems and components are functioning correctly against performance requirements.<br>(PC 5.2.3)   | (Range 1, 2, 4) |
| 4. | Check and adjust controls to meet specifications.<br>(PC 5.2.4)   | (Range 1, 2, 4) |

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The sources of information on the performance of systems or components  
(PC 5.2.1) (Range 1, 2)
2. The procedures for establishing correct system or component performance and checking against the design specification.  
(PC 5.2.3, 5.2.4) (Range 1, 3)
3. The routines and sequences for commissioning systems or components.  
(PC 5.2.3, 5.2.4) (Range 1, 2, 4)
4. The points in the commissioning process where co-operation and liaison with other trades and customers may be required.  
(PC 5.2.2) (Range 3)
5. The sources of user information appropriate to different systems and components.  
(PC 5.2.5) (Range All)
6. How to complete commissioning documentation confirming the safe commissioning of systems and components.  
(PC 5.2.1) (Range 1, 2)
7. System hand-over procedures and demonstrating the operation of systems and components to end-users.  
(PC 5.2.5) (Range All)
8. The actions to take when components being commissioned, do not meet design requirements.  
(PC All) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

*To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Carry out the full mechanical and electrical commissioning of the system
  - b. Complete and issue appropriate documentation
  - c. Carry out on at least three occasions the commissioning of one or more of the following systems:
    - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
    - System capable of reverse cycle heat pumping and/or forced defrost
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.



**Unit 005**                      **Commission and de-commission RAC systems  
-small commercial refrigeration and air conditioning  
systems**

Element 5.3                      De-commission systems

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 5.3.1 **Liaise with other persons<sup>(1)</sup> at appropriate points within the de-commissioning process to minimise disturbance to work routines.**
- 5.3.2 **Check that conditions within the systems or components<sup>(2)</sup> will permit safe de-commissioning.**
- 5.3.3 **De-commission systems or components<sup>(2)</sup> using tests and procedures, which comply with industry requirements<sup>(3)</sup>.**
- 5.3.4 **Take precautionary actions<sup>(4)</sup> to ensure that de-commissioned systems or components<sup>(2)</sup> do not prove a safety hazard.**

*Candidates will be required to produce evidence for all range items*

## **Range**

### **1. Other Persons**

- a. Customers
- b. Other workers
- c. Public

### **2. Systems or Components**

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for systems within the Range:
  - Mechanical, electrical and electronic components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### **3. Industry Requirements**

- a. Statutory regulations and requirements
- b. Safety legislation governing activities in the workplace
- c. Work sequences
- d. Co-ordination with the work of others
- e. Work practices and decommissioning techniques for systems or components
- f. Company procedures
- g. In accordance with industry's expectations of:
  - Air conditioning engineer
  - Refrigeration engineer
- h. Statutory requirements for disposal of contaminated and hazardous waste
- i. BS EN 378

### **4. Precautionary Actions**

- a. Liaison with other persons
- b. Safe systems shutdown
- c. Labelling systems and components
- d. Systems and components isolation
- e. Signage, warning and barriers

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Ensure the safety of all relevant persons involved in, or affected by, the de-commissioning process.  
(PC All) (Range All)
2. Recover system contents without leakage and confirm that it is:
  - i) empty
  - ii) safe for further work(PC 5.3.2, 5.3.3, 5.3.4) (Range All)
3. Ensure system or section of the system is isolated from use, operation and all energy sources.  
(PC 5.3.2, 5.3.3, 5.3.4) (Range All)
4. Remove components for reclaim or disposal.  
(PC 5.3.3, 5.3.4) (Range All)
5. Identify, label and store components or contents for re-use.  
(PC 5.3.3, 5.3.4) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The importance of confirming the system design, specification, functions and the outcomes of suspending the operation of the system.  
(PC 5.3.1) (Range 1)
2. How to liaise with others, whose procedures or routines may be affected by the suspension of the system operation.  
(PC 5.3.1) (Range 1)
3. The potential hazards that could arise from the de-commissioning activities and the checks that need to be carried out before decommissioning takes place.  
(PC 5.3.2, 5.3.4) (Range 2, 4)
4. De-commissioning procedures for temporary and permanent de-commissioning of systems.  
(PC 5.3.3) (Range 2, 3)
5. The precautions to ensure that decommissioned systems do not prove a safety hazard – measures to prevent systems being brought into operation – safety and warning notices.  
(PC 5.3.4) (Range 2, 4)
6. How to safely collect and dispose of system contents that may be hazardous to health or harmful to the environment.  
(PC 5.3.3, 5.3.4) (Range 2, 3, 4)
7. How to complete systems de-commissioning records.  
(PC All) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Carry out decommissioning activities on at least three occasions preferably on more than one of the following systems or significant parts of them:
    - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
    - System capable of reverse cycle heat pumping and/or forced defrost
  - b. Specify the necessary arrangements which need to be made for decommissioning to be carried out in (a) above to:
    - i) ensure safety
    - ii) notify relevant people
  - c. Complete and issue appropriate documentation.
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Note:**            *This is what the candidate must do:*

**Unit 006**        **Install RAC systems and components**  
**-small commercial refrigeration & air conditioning systems**  
***This involves being able to:***

Element 6.1    Prepare work locations for the installation of systems and components  
Element 6.2    Carry out the installation of systems and components

---

### **Unit Commentary**

- This unit measures the candidate's ability to ensure that the work location is properly prepared for the work involved in carrying out the installation and testing of systems and components
- Candidates are required to apply their skills and knowledge in a wide variety of work activities including those that are complex and those that are non-routine. They must be able to make decisions within their sphere of responsibility
- Candidates will be capable of collaborative working to achieve common objectives
- It is expected that candidates will carry out the appropriate soundness tests during or after the installation of components.
- At this level, candidates should possess a detailed knowledge of operating principles within the range of systems. They should also be capable of installing an entire system.
- This unit requires candidates to install, connect and test (for soundness) system pipework and inter-connecting wiring. Where appropriate, evidence should be assessed to meet the recognised requirements for the industry.

**Unit 006**                      **Install RAC systems and components  
-small commercial refrigeration and air conditioning  
systems**

Element 6.1                      Prepare work locations for the installation of systems and  
components

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 6.1.1 Ensure that safety provisions <sup>(1)</sup> within the immediate work location conform to the requirements of health and safety legislation.**
- 6.1.2 Ensure that access provision <sup>(2)</sup> to and from the immediate work location complies with health and safety requirements for the safe movement of the workforce, members of the public and materials.**
- 6.1.3 Report any pre-installation damage or defects to the existing building fabric <sup>(4)</sup> to the job supervisor/line manager.**
- 6.1.4 Protect customer's property <sup>(3)</sup> and the building fabric <sup>(4)</sup> against possible damage being caused during the installation process.**
- 6.1.5 Check that input services <sup>(5)</sup> to the system components are suited to their intended purpose.**
- 6.1.6 Confirm that the customer has job information <sup>(6)</sup> on all key aspects of the installation process.**
- 6.1.7 Confirm that all materials, tools and equipment <sup>(7)</sup> necessary for the installation process will be available as required.**
- 6.1.8 Arrange safe storage provision for materials, tools and equipment <sup>(7)</sup>, which meet industry requirements.**
- 6.1.9 Confirm that the preparatory work <sup>(8)</sup> meets the installation requirements of systems and components <sup>(9)</sup>.**

*Candidates will be required to produce evidence for all range items*

## **Range**

### **1. Safety Provisions**

- a. Personal protection equipment
- b. Fire fighting equipment
- c. First aid equipment
- d. Accident prevention methods
- e. Tools and equipment
- f. Risk assessment
- g. Permit to work
- h. Method statements
- i. COSHH assessment

### **2. Access Provision**

- a. Ladders
- b. Scaffold – fixed and mobile
- c. Walkways
- d. Access equipment

### **3. Customers' Property**

- a. Domestic
- b. Industrial
- c. Commercial

### **4. Building Fabric**

- a. Walls
- b. Floor
- c. Fittings, fixtures/finishes
- d. Roofs
- e. Installation
- f. Services

### **5. Input Services**

- a. Connections to existing systems (refrigeration, air conditioning)
- b. Connections to existing supplies for electricity, water, drainage

### **6. Job Information**

- a. Specifications
- b. Drawings
- c. statutory regulations and recommendations
- d. Instructions – verbal or written
- e. Installation programme



## **7. Materials, Tools and Equipment**

- a. System components
- b. Hand tools
- c. Powered tools
- d. Mechanical tools
- e. Access equipment
- f. Method Statement
- g. COSHH assessment

## **8. Preparatory Work**

- a. Relevant to the work activities

## **9. Systems and Components**

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for Systems Within the Range
  - Mechanical, electrical and electronic components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

## Performance Evidence

1.	Check and confirm the safety of the work location (PC 6.1.1)	(Range 1, 6)
2.	Check the appropriate arrangements are in place for the movement and storage of materials, tools and equipment (PC 6.1.2, 6.1.8)	(Range 2, 7)
3.	Confirm that all necessary input services to which the components will be connected are available and of the correct type (PC 6.1.5)	(Range 5, 6, 8, 9)
4.	Access the suitability of the electrical supply (temporary or permanent) for the tools and equipment to be used in carrying out the work (PC 6.1.5)	(Range 5, 6, 8, 9)
5.	Confirm that the electrical supply is suitable for the systems requirements. (PC 6.1.5)	(Range 5, 6, 8, 9)
6.	Ensure that all materials, tools and equipment to carry out the work are available on site at the appropriate time and meet industry requirements. (PC 6.1.7)	(Range 7)
7.	Confirm that the necessary safety and access provisions are taken account of in work activities arising from risk assessment or where a permit to work may be required. (PC 6.1.1, 6.1.2)	(Range 1, 2, 6)
8.	Ensure minimum disturbance or damage to the customer's property. (PC 6.1.3, 6.1.4)	(Range 3, 4 ,8)
9.	Explain to customers job, deadlines and potential disruptions, and negotiate alterations best suited to them within constraints previously agreed. (PC 6.1.6)	(Range 6)
10.	Ensure that preparatory work, relevant to the work activity, meets the installation requirements of systems and components. (PC 6.1.9)	(Range 8, 9)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The sources of information for the required preparatory work prior to installing the system or component  
(PC 6.1.4, 6.1.9) (Range 1, 6, 8, 9)
2. Regulations and recommendations governing safety in the workplace. General responsibilities of the operative for their own safety and that of others who may be affected by their actions.  
(PC 6.1.1) (Range 1, 6)
3. The equipment necessary in order to provide safe access while working at heights, or in confined spaces.  
(PC 6.1.2) (Range 2, 6)
6. How to protect customer's property or the building fabric prior to the work commencing.  
(PC 6.1.3, 6.1.4) (Range 3, 4, 8)
7. The input services or supplies required for new systems or components, or for extending systems or adding components to existing systems - how to confirm that input services are adequate.  
(PC 6.1.5) (Range 5, 6, 8, 9)
8. The person to whom deficiencies in input services should be reported and procedures for isolating input services.  
(PC 6.1.5) (Range 5, 6, 8, 9)
9. How to ensure that the customer is fully briefed on all aspects of the installation programme.  
(PC 6.1.6) (Range 6)
10. The tools, equipment, materials and components required for the system installation – order and supply advice, delivery and checking procedures.  
(PC 6.1.7) (Range 6, 7)

- |     |  |              |
|-----|--|--------------|
| 11. | The actions to be taken should materials not be available on site in order to start the installation activity.<br>(PC 6.1.7)   | (Range 6, 7) |
| 12. | Secure storage procedures for tools, equipment, materials and components – basic stores procedures to ensure security and to minimise loss or wastage.<br>(PC 6.1.8) | (Range 7)    |

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

*To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Produce evidence from a minimum of two work locations incorporating a significant proportion of the installation.
  - b. Include examples of documentary evidence such as records made by the candidate and passed on to the customer, diary entries, delivery notes and timesheets.
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Unit 006**                      **Install RAC systems and components  
-small commercial refrigeration and air conditioning  
systems**

Element 6.2                      Carry out the installation of systems and components

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 6.2.1 **Confirm that the materials, tools and equipment <sup>(1)</sup> required for the installation processes are fit for their intended purpose.**
- 6.2.2 **Assemble system components <sup>(2)</sup> using work methods that conform to industry requirements <sup>(3)</sup>.**
- 6.2.3 **Position system components <sup>(2)</sup> to conform to the system design requirement <sup>(4)</sup>.**
- 6.2.4 **Fix system components <sup>(2)</sup> using methods that conform to industry requirements <sup>(3)</sup>.**
- 6.2.5 **Connect system components <sup>(2)</sup> to systems and input services <sup>(7)</sup> using methods that meet industry requirements <sup>(3)</sup>.**
- 6.2.6 **Carry out the installation processes following industry requirements <sup>(3)</sup> while minimising damage to customer property and building features.**
- 6.2.7 **Report to the immediate job supervisor, line manager (or customer) circumstances that affect the progress of the installation in line with industry requirements <sup>(3)</sup>.**
- 6.2.8 **Confirm the integrity of the installed system using testing procedures <sup>(5)</sup>.**
- 6.2.9 **Take precautionary actions <sup>(6)</sup> to prevent the unauthorised use of un-commissioned system components <sup>(2)</sup>.**

*Candidates will be required to produce evidence for all range items*

## **Range**

### **1. Materials, Tools and Equipment**

- a. System components
- b. Hand tools
- c. Powered tools
- d. Mechanical tools
- e. Access equipment
- f. PPE

### **2. Systems or Components**

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for Systems Within the Range
  - Mechanical and electrical components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### **3. Industry Requirements**

- a. Statutory regulations and recommendations
- b. Safety legislation governing activities in the workplace
- c. Work sequences
- d. Co-ordination with work of others
- e. Work practices and installation techniques for systems or components
- f. Company procedures

### **4. System Design Requirement (eg: mechanical, electrical, electronic)**

- a. Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
- b. Systems capable of reverse cycle heat pumping and/or forced defrost
- c. Component types, location and positions
- d. Connections and fixing requirements

### **5. Testing Procedures**

- a. Electrical integrity
- b. Leak tight

**6. Precautionary Actions**

- a. Liaison with other persons
- b. Safe system shut down
- c. Labelling systems and components
- d. Systems and components isolation
- e. Signage, warning and barriers

**7. Input Services**

- a. Connection to existing systems (refrigeration, air conditioning)
- b. Connection to existing supplies for electric, water, drainage
- c. Temporary or permanent supplies for tools and equipment



## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Fabricate, assemble, position and fix system components as specified that conform to industry regulations, fixing methods and tools.  
(PC 6.2.2, 6.2.3, 6.2.4) (Range 1, 2, 3, 4)
2. Check the input services are appropriate to the system's requirements.  
(PC 6.2.5) (Range 2, 3, 4, 7)
3. Assess the suitability of the electrical supply for the tools and equipment to be used in carrying out the work.  
(PC 6.2.5) (Range 2, 3, 4, 7)
4. Confirm that the electrical supply is suitable for the system's requirements.  
(PC 6.2.5) (Range 2, 3, 4, 7)
5. Identify, record and report any defects and potential dangers which arise prior to, or as the work is being undertaken.  
(PC 6.2.7) (Range 2, 3)
6. Reduce waste of materials and time to a minimum.  
(PC 6.2.2, 6.2.4) (Range 2, 3)
7. Connect system components according to industry requirements.  
(PC 6.2.5) (Range 2, 3, 7)
8. Carry out soundness testing procedures on systems and components including input services for system integrity.  
(PC 6.2.8) (Range 2, 3, 5)
9. Confirm that precautionary actions are observed during the installation operation.  
(PC 6.2.9) (Range 2, 3, 5, 6)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. How to measure and record installation and site details for prefabrication purposes.  
(PC 6.2.2) (Range 2, 3, 4)
2. The industry practices and work standards for fabricating and installing system components.  
(PC 6.2.2) (Range 2, 3, 4)
3. The positioning and fixing requirements for system components, which conform to the system design and intended functions.  
(PC 6.2.3, 6.2.4) (Range 2, 3, 4)
4. The procedures required for connecting to input services or connecting pipework into existing systems.  
(PC 6.2.5) (Range 1, 2, 3, 4, 7)
5. Methods of working which protect the building fabric, customer property and existing systems or components.  
(PC 6.2.6, 6.2.9) (Range 3, 6)
6. Management responsibilities within the workplace and the methods of reporting and recording job progress or identifying problems that will delay progress.  
(6.2.7) (Range 3, 6)
7. The care and maintenance requirements of tools and equipment, and how to check that they are in a safe condition.  
(PC 6.2.1) (Range 1)
8. The range of tests that are used to confirm the soundness of systems and components and how to use the soundness test equipment.  
(PC 6.2.8) (Range 5)
9. The precautionary actions required during installation and testing.  
(PC 6.2.9) (Range 2, 3, 5, 6)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Install:
    - i) Pipework and conduit (copper, steel, plastic)
    - ii) Brackets and supports
    - iii) Heat exchange devices
    - iv) Compressors
    - v) Controls (mechanical)
    - vi) Controls (electrical) from the appropriate supply
    - vii) Pressure vessels
    - viii) Pre-fabricated items
  - b. Install the items listed in (a) on at least three occasions, preferably on more than one of the following systems:
    - i) Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
    - ii) Systems capable of reverse cycle heat pumping and/or forced defrost
  - c. Connect and test:
    - i) Pipework and conduit (copper, steel, plastic)
    - ii) Brackets and supports
    - iii) Heat exchange devices
    - iv) Compressor sets and packs
    - v) Controls (mechanical)
    - vi) Controls (electrical) from the appropriate supply
    - vii) Pre-fabricated items
  - d. Apply the following tests:
    - i) Pressure
    - ii) Leakage
    - iii) Electrical tests (continuity and earth leakage)
  - e. Connect the items listed in (c) and apply the tests (d) on at least three occasions within one, or preferably more, of the following systems:
    - iii) Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
    - iv) Systems capable of reverse cycle heat pumping and/or forced defrost
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria

**Note:**            ***This is what the candidate must do:***

**Unit 007**        **Service and maintain RAC systems and components**  
**-small commercial refrigeration and air conditioning systems**  
***This involves being able to:***

- Element 7.1    Establish service and maintenance requirements for systems and components
- Element 7.2    Carry out the service and maintenance of systems and components
- Element 7.3    Diagnose the cause and rectify faults in systems and components
- 

### **Unit Commentary**

- This unit measures the candidate's ability to plan, organise and execute both planned maintenance and breakdown service.
- Candidates are required to apply their skills and knowledge in a wide variety of work activities including those that are complex and those that are non-routine. They must also be able to make decisions within their sphere of responsibility
- Candidates will be capable of collaborative working to achieve common objectives
- Maintenance requirements will normally be planned from schedules provided. Candidates are required however to produce simple schedules for less complex systems using normal sources of information.
- Candidates should be able to diagnose:
  - Mechanical faults within the systems
  - Electrical faults within the system, from the main electrical isolator for the system and including electronic components

**Unit 007**                      **Service and maintain RAC systems and components  
-small commercial refrigeration & air conditioning systems**

Element 7.1                      Establish service and maintenance requirements for systems  
and components

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 7.1.1 Confirm that the information <sup>(1)</sup> necessary to service and maintain system or components <sup>(2)</sup> is available.**
- 7.1.2 Identify the activities that make up the maintenance schedule for the system or component <sup>(2)</sup>.**
- 7.1.3 Plan service and maintenance work on the system or components <sup>(2)</sup> to minimise the disruption of system operation.**
- 7.1.4 Confirm that all materials, tools and equipment <sup>(3)</sup> necessary for the service and maintenance activities will be available as required.**
- 7.1.5 Liaise with other persons <sup>(4)</sup> at appropriate points within the maintenance activities to minimise disruption to work routines.**
- 7.1.6 Confirm that maintenance activities comply with industry requirements <sup>(5)</sup>.**

## Range

### 1. Information

- a. Maintenance schedule
- b. Technical data
- c. Manufacturer's recommendations
- d. Design specifications
- e. Client responsibilities

### 2. Systems or Components

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for Systems within the Range
  - Mechanical, electrical and electronic components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### 3. Materials, Tools and Equipment

- a. Refrigerants
- b. Lubricants
- c. Cleaning materials
- d. Specialist equipment
- e. Access equipment
- f. Lifting equipment
- g. PPE
- h. Tools as appropriate

### 4. Other Persons

- a. Customers
- b. Other workers
- c. Public

### 5. Industry Requirements

- a. Statutory regulations, recommendations and system documentation (EPA, HASAWA, COSHH)
- b. Work sequences for maintenance
- c. Co-ordination with other trades/customers
- d. Maintenance practice and procedures
- e. Company procedures
- f. Safety legislation governing activity in the workplace
- g. BS EN 378

- h. Statutory requirements for disposal of contaminated and hazardous waste
- i. In accordance with industry's expectations of:
  - Air conditioning engineer
  - Refrigeration engineer

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Identify the systems maintenance requirements and organise them into a logical work sequence  
(PC 7.1.1, 7.1.2, 7.1.3) (Range 1, 2)
2. Produce simple operational plans using pro-forma and self-composed plans which meet requirements of customers, the company and industry requirements.  
(PC 7.1.3, 7.1.5, 7.1.6) (Range All)
3. Quantify and ensure the tools, materials and equipment required to undertake the work are available as required.  
(PC 7.1.4) (Range 3)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range



## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The range of information that should be available on the routine and non-routine service and maintenance requirements of systems and components.  
(PC 7.1.1) (Range 1, 2)
2. The service and maintenance procedures across the range of systems and components.  
(PC 7.1.2, 7.1.6) (Range All)
3. How to plan, service and maintenance procedures to minimise interference with system operation and customer routines.  
(PC 7.1.3) (Range All)
4. How and when to liaise with others during service and maintenance activities.  
(PC 7.1.5) (Range 4, 5)
5. The materials required for routine maintenance and sources of information on the materials required for structured servicing operations.  
(PC 7.1.4) (Range 3)
6. The tools and equipment required for routine maintenance and structured servicing operations.  
(PC 7.1.4) (Range 3)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Demonstrate the ability to identify maintenance requirements for all of the following systems:
    - i) Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
    - ii) Systems capable of reverse cycle heat pumping and/or forced defrost
  - b. Demonstrate the ability to plan work and organise the availability of tools, materials and equipment.
3. In addition, candidates must possess sufficient knowledge and understanding across the range and satisfy all performance criteria.

**Unit 007**                      **Service and maintain RAC systems and components  
-small commercial refrigeration and air conditioning  
systems**

Element 7.2                      Carry out the service and maintenance of systems and  
components

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

**7.2.1 Carry out service and maintenance activities using procedures that  
comply with industry requirements<sup>(1)</sup>.**

**7.2.2 Service and maintain system and components<sup>(2)</sup> to ensure continued  
effective operation of the system.**

**7.2.3 Complete records<sup>(3)</sup> to provide an accurate history of the service and  
maintenance of system and components<sup>(2)</sup>.**

## Range

### 1. Industry Requirements

- a. Statutory regulations, recommendations and system documentation
- b. Work sequences for maintenance activity including repair of electrical, mechanical and electronic components
- c. Co-ordination with other trades
- d. Maintenance methods including fault diagnosis
- e. Company procedures
- f. Performance specifications
- g. In accordance with industry's expectations of:
  - Air conditioning engineer
  - Refrigeration engineer
- h. Safety legislation covering activities in the workplace
- i. BS EN 378
- j. Statutory requirements for disposal of contaminated and hazardous waste

### 2. System or Components

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for Systems within the Range
  - Mechanical, electrical and electronic components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### 3. Records

- a. Any legislative and industry records (refrigerant and oil usage)
- b. Schedules
- c. Company records (job sheets, service reports, log books)

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Safely isolate components from input services and all other sources of energy.  
(PC 7.2.1) (Range 1, 2)
2. Check component performance or operation to identify faults, using the appropriate fault diagnosis techniques.  
(PC 7.2.1, 7.2.2) (Range 1, 2)
3. Carry out routine repairs, maintenance and cleaning of components in accordance with industry requirements including electrical, mechanical and electronic components.  
(PC 7.2.1, 7.2.2) (Range 1, 2)
4. Complete service and maintenance records to industry requirements.  
(PC 7.2.3) (Range 2, 3)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. How to use performance specifications for systems and components and the service and maintenance procedures necessary to restore or maintain the continued performance of systems and components.  
(PC All) (Range All)
2. The service and maintenance procedures necessary to ensure compliance with industry requirements for routine and non-routine service and maintenance activities.  
(PC 7.2.1, 7.2.2) (Range 1, 2)
3. How to complete records and reports of the service and maintenance of systems and components.  
(PC 7.2.3) (Range 3)
4. The action to take when the system or component does not work to full performance specification.  
(PC All) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Apply the listed work practices and procedures to undertake maintenance of the following components:
    - Pipework and conduit (copper, steel and plastic)
    - Brackets and supports
    - Heat exchange devices
    - Compressor sets and packs
    - Controls (electrical and mechanical)
    - Controls (electronic) within the candidates limited responsibility
    - Pressure vessels
    - Other ancillary system components
  - b. Carry out (a) on all of the following systems:
    - (i) Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
    - (ii) Systems capable of reverse cycle heat pumping and/or forced defrost
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Unit 007**                      **Service and maintain RAC systems and components  
-small commercial refrigeration and air conditioning  
systems**

Element 7.3                      Diagnose the cause and rectify faults in systems and  
components

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 7.3.1 Diagnose faults<sup>(1)</sup> in systems or components<sup>(2)</sup> using procedures that comply with industry requirements<sup>(3)</sup>.**
- 7.3.2 Liaise with other persons<sup>(4)</sup> to agree fault rectification procedures that will minimise disruption to work routines.**
- 7.3.3 Rectify faults<sup>(1)</sup> in systems to restore the system or component<sup>(2)</sup> function to performance specification.**
- 7.3.4 Take precautionary actions<sup>(5)</sup> to prevent the unauthorised use of unsafe systems or components<sup>(2)</sup>.**



## Range

### 1. Faults

- Inability to maintain specified temperatures and pressures
  - a) Temperature of product or space
  - b) System temperature
  - c) System pressure
- Noise from the system
- Component failure (electrical or mechanical)
- Refrigerant leakage, including recharging of systems using appropriate methods
- Fouling of Heat Exchanger surfaces (air, water, evaporative)
- Oil system malfunctions
- Airflow faults
- Drain blockages
- Inadequate or deteriorated insulation

### 2. Systems or Components

- a. Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- b. Components for Associated Systems
  - Mechanical, electrical and electronic components and controls for appropriate systems.
  - Associated system components (drainage, fans, pumps, ventilation, water systems)

### 3. Industry Requirements

- a. Statutory regulations, recommendations and system documentation
- b. Work sequences for maintenance activity
- c. Co-ordination with other trades/customers
- d. Company procedures
- e. Maintenance practices and procedures
- f. In accordance with industry's expectations of:
  - Air conditioning engineer
  - Refrigeration engineer
- g. Safety legislation governing activities in the workplace
- h. Maintenance practices and procedures
- i. BS EN 378
- j. Statutory requirements for disposal of contaminated and hazardous waste

**4. Other Persons**

- a. Customers
- b. Other workers
- c. Public

**5. Precautionary Actions**

- a. Liaison with other persons
- b. Minimise risk to individuals and the environment
- c. Safe systems shutdown
- d. Labelling systems of components
- e. Systems and components isolation
- f. Signage, warning and barricades

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Take appropriate action to any reported fault according to organisational procedures.  
(PC 7.3.2) (Range All)
2. Establish the system and work locations are safe.  
(PC 7.3.1) (Range All)
3. Use a logical sequence to find faults.  
(PC 7.3.1) (Range 1, 2, 3)
4. Use appropriate servicing and maintenance equipment to rectify faults.  
(PC 7.3.3) (Range 1, 2, 3, 5)
5. Inform people where rectification is or cannot be completed.  
(PC 7.3.1, 7.3.2, 7.3.3) (Range 1, 2, 3, 4)
6. Confirm that precautionary actions have taken place to prevent unauthorised use of unsafe systems or components.  
(PC 7.3.4) (Range 2, 5)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. How to interpret information on system or component performance, including feedback from users, visual inspections, checks or diagnostic tests to locate faults.  
(PC All) (Range All)
2. The work procedures for the rectification of faults in systems or components that will ensure minimum disruption to customers and routines.  
(PC 7.3.1, 7.3.2) (Range 1, 2, 3, 4)
3. How to liaise with others to ensure co-operation in the fault rectification process.  
(PC 7.3.2) (Range 1, 2, 3, 4)
4. The work action and sequences required to rectify faults in systems and components.  
(PC 7.3.3) (Range 1, 2)
5. The measures to ensure that systems do not present a safety hazard to potential users, or the workplace, when carrying out rectification procedures.  
(PC 7.3.4) (Range 2, 5)
6. The actions to be taken when the system or component cannot be restored to full performance.  
(PC All) (Range All)
7. How to isolate unsafe systems and components.  
(PC All) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Diagnose and repair the following faults:
    - Non-maintenance of specified temperatures and pressures
      - i) Temperature of produce or space
      - ii) System temperature
      - iii) System pressures
    - Noise from the system
    - Component failure (electrical or mechanical)
    - Refrigerant leakage, including recharging of systems using appropriate methods
    - Fouling of heat exchange surfaces (air, water, evaporative)
    - Oil system malfunctions
    - Airflow faults
    - Drain blockage
    - Inadequate or deteriorated insulation
  - b. Carry out the requirements of (a) on all the following systems:
    - (i) Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
    - (ii) Systems capable of reverse cycle heat pumping and/or forced defrost
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Note:**            *This is what the candidate must do:*

**Unit 008**        **Design RAC systems**  
**-small commercial refrigeration & air conditioning systems**  
***This involves being able to:***

Element 8.1    Identify customer's requirements

Element 8.2    Design systems to meet customer's needs

---

### **Unit Commentary**

- This unit measures the candidate's ability to deal with customers in identifying their requirements and providing commercially acceptable solutions to them.
- Customer's requirements are most likely to be identified indirectly from documentation and line managers or supervisors.
- Customers within this unit cover the client, the client's representatives, sub-contractors and internal contacts within the candidate's employing organisation, as appropriate.
- Candidates are required to apply their skills and knowledge in a wide variety of work activities including those that are complex and those that are non-routine. They must be able to make decisions within their sphere of responsibility
- Candidates will be capable of collaborative working to achieve common objectives
- The range of competence required for this unit extends to the planning and configuring of pipework and electrical wiring as well as to changes and alterations required by the customer throughout the installation, commissioning, maintenance and service of systems.
- In terms of design, candidates must be able to assess the implications, impact and feasibility of alterations and changes to the system within their range of responsibility.
- References to costs relate to the time and materials required to undertake the work, rather than to detailed costings.

**Unit 008**

**Design RAC systems  
-small commercial refrigeration & air conditioning systems**

Element 8.1 Identify customer's requirements

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 8.1.1 Identify and record the customer job requirements<sup>(1)</sup>.**
- 8.1.2 Obtain and record information on site structures and features<sup>(2)</sup>.**
- 8.1.3 Identify any areas of the proposed installation where compliance with industry requirements<sup>(3)</sup> is necessary.**
- 8.1.4 Prepare a range of design options that comply with key design requirements<sup>(4)</sup>.**
- 8.1.5 Use a range of methods of presentation<sup>(5)</sup> to explain design options to the customer which meet identified requirements.**
- 8.1.6 Obtain customer agreement<sup>(6)</sup> to the design proposals.**

## Range

### 1. Customer Job Requirements

- a. System design concept and layout
- b. Locations of components
- c. Appliances
- d. Materials
- e. Controls
- f. System performance
- g. Specifications
- h. Statutory regulations and recommendations
- i. Structures and features of the work location

For:

- (i) Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- (ii) Components for Systems within the Range
  - Mechanical, electrical and electronic components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### 2. Site Structures and Features

- a. Structures intended use
- b. Method of construction and materials used
- c. Performance requirements of systems and components
- d. Availability of input services

### 3. Industry Requirements

- a. Statutory regulations and recommendations
- b. Specifications
- c. Company procedures
- d. In accordance with industry's expectations of:
  - Air conditioning engineer
  - Refrigeration engineer

### 4. Key Design Requirements

- a. System design concept and layout
- b. Location of components
- c. Appliances
- d. Materials
- e. Controls
- f. System performance
- g. Specifications



For:

- (i) Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
  
- (ii) Components for Systems within the Range
  - a. Mechanical, electrical and electronic components and controls for appropriate systems
  - b. Components of associated systems (drainage, fans, pumps, ventilation, water systems)

## **5. Methods of Presentation**

- a. Oral
- b. Written
- c. Standard company procedures

## **6. Forms of Agreement**

- a. Oral
- b. Written
- c. Standard company procedures

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Identify customer requirements in respect of the system type, function, installation and performance.  
(PC 8.1.1) (Range 1)
2. Discuss requirements of the installation and implications of changes to the pre-designed system.  
(PC 8.1.5) (Range 5)
3. Produce records and sketches as required by company procedures.  
(PC 8.1.2) (Range 2)
4. Incorporate oral and written information on design requirements.  
(PC All) (Range 3)
5. Ensure that proposed options:
  - a. Comply with information on design requirements
  - b. Comply with specifications and drawings
  - c. Take account of the work locations, structures and features(PC 8.1.1, 8.1.2, 8.1.3, 8.1.4, 8.1.5) (Range 1, 2, 3, 4, 5)
6. Confirm customer agreement to the design proposals.  
(PC 8.1.6) (Range 6)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. How to obtain information from site drawings and plans.  
(PC 8.1.1, 8.1.2) (Range 1, 2)
2. How to carry out site surveys.  
(PC 8.1.2) (Range 2)
3. The range of documentation detailing industry requirements.  
(PC 8.1.3) (Range 3)
4. How to identify possible design options which meet the following:
  - a. Customer requirements
  - b. Site structure and features
  - c. Industry requirements(PC 8.1.3, 8.1.4, 8.1.5) (Range 3, 4, 5)
5. How to obtain agreement from the customer to progress a selected design option.  
(PC 8.1.5, 8.1.6) (Range 5, 6)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Provide evidence from a minimum of two work locations where significant changes to the original specification have occurred.
  - b. Demonstrate clearly the ability to interpret and apply oral and written information on design requirements.
  - c. Produce a typical company report for variations to the original specification.
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Unit 008**                      **Design RAC systems**  
**-small commercial refrigeration & air conditioning systems**

Element 8.2                      Design systems to meet customers' needs

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 8.2.1 Design systems to meet key design requirements <sup>(1)</sup>.**
- 8.2.2 Carry out design calculations to determine system component <sup>(2)</sup> requirements.**
- 8.2.3 Present <sup>(3)</sup> the design in a manner that will enable customer agreement.**
- 8.2.4 Confirm that the completed system design meets key design requirements <sup>(1)</sup>.**
- 8.2.5 Amend system design options to meet customer job requirements <sup>(4)</sup>.**

## Range

### 1. Key Design Requirements

- a. System design concept and layout
- b. Locations of components
- c. Appliances
- d. Materials
- e. Controls
- f. System performance
- g. Specifications
- h. Statutory regulations and recommendations
- i. Structures and features of the work location

For:

- (i) Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
- (ii) Components for Systems within the Range
  - Mechanical, electrical and electronic components and controls for appropriate systems
  - Components of associated systems (drainage, fans, pumps, ventilation, water systems)

### 2. System Components

- a. Appliances
- b. Materials
- c. Controls

### 3. Present

- a. Oral information
- b. Written information
- c. Visual information
- d. Information using ICT (Information and Communication Technology)

### 4. Customer Job Requirements

- a. System design concept and layout
- b. Locations of components
- c. Appliances
- d. Materials
- e. Controls
- f. System performance
- g. Specifications

For:

- (i) Systems
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost
  
- (ii) Components for Systems within the Range
  - a. Mechanical, electrical and electronic components and controls for appropriate systems
  - b. Components of associated systems (drainage, fans, pumps, ventilation, water systems)

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Incorporate the customers' requirements into a workable modification.  
(PC All) (Range All)
2. Incorporate the customers' requirements for alterations to the original specification into a workable option.  
(PC All) (Range All)
3. Ensure that the proposed options are agreed with the customer.  
(PC 8.2.3, 8.2.4, 8.2.5) (Range All)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range



## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The range of job information that is required to carry out design work on:
  - a. New buildings
  - b. Existing properties(PC 8.2.1, 8.2.4) (Range 1, 4)
2. Positioning requirements for components within systems and standard system layouts.  
(PC 8.2.1, 8.2.4) (Range 1, 2)
3. How to calculate the requirements of system components – size and specification:  
(PC 8.2.2) (Range 1, 4)
4. Methods of presenting design information to customers
  - a. Drawings
  - b. Specifications
  - c. Quotations(PC 8.2.3, 8.2.5) (Range 2, 4)
5. How information and communications technology (ICT) may be used in presenting design information.  
(PC 8.2.3) (Range 3)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Provide evidence from a minimum of two work locations where significant changes to the original specification have occurred.
  - b. Demonstrate clearly the ability to interpret and apply oral and written information on design requirements.
  - c. Produce a typical company report for variations to the original specification.
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.

**Note:**            *This is what the candidate must do:*

**Unit 009**        **Specify programmes for working on RAC systems**  
**-small commercial refrigeration and air conditioning systems**  
***This involves being able to:***

Element 9.1    Produce and monitor work programmes

Element 9.2    Negotiate job contract terms and conditions

---

### **Unit Commentary**

- This unit measures the candidate's ability to produce, negotiate and agree programmes of work relative to the range of work for which they are responsible.
- Candidates are required to apply their skills and knowledge in a wide variety of work activities including those that are complex and those that are non-routine. They must be able to make decisions within their sphere of responsibility.
- Candidates will be capable of collaborative working to achieve common objectives
- It involves identifying the activities involved when undertaking a significant part of an installation and specifying the requirements for:
  - Human resources
  - Equipment
  - Material requirements.
- Candidates will be expected to produce programmes of work for their part of the project.
- It is important that candidates are able to adjust programmes when deviations or variations occur in order to maintain completion dates or minimise overrun.
- This will apply to the following systems:
  - Small direct expansion refrigeration and/or air conditioning systems comprising a single compressor and a single evaporator
  - Systems capable of reverse cycle heat pumping and/or forced defrost

**Unit 009**                      **Specify programmes for working on RAC systems  
-small commercial refrigeration & air conditioning systems**

Element 9.1                      Produce and monitor work programmes

**Performance Criteria**

**The candidate must provide evidence to prove that they can:**

- 9.1.1 Produce details of resource requirements<sup>(1)</sup> for system installations.**
- 9.1.2 Produce work programmes<sup>(2)</sup> which make the best use of resources within the contract conditions<sup>(3)</sup>.**
- 9.1.3 Schedule any inspection or approval requirements<sup>(4)</sup> by third party organisations within the work programme.**
- 9.1.4 Produce a schedule of payments for the job based on the contract conditions<sup>(3)</sup>.**
- 9.1.5 Monitor the progress of jobs against the work programmes<sup>(2)</sup>.**
- 9.1.6 Negotiate revisions to work programmes<sup>(2)</sup> where modifications and deviations prove necessary.**

*Candidates will be required to produce evidence for all range items*

**Range**

**1. Resource Requirements**

- a. Human resources
- b. Materials
- c. Plant and equipment
- d. Tools

**2. Work Programmes**

- a. Work sequences
- b. Work plans
- c. Bar charts

**3. Contract Conditions**

- a. Standard form of contract

**4. Inspection or Approval Requirements**

- a. Statutory regulations and recommendations affecting the work undertaken
- b. Safety legislation affecting the work undertaken

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Identify resource requirements and schedule work programmes incorporating:
  - a. operational constraints
  - b. inspections
  - c. work completion timescale
  - d. best use of resources(PC 9.1.1, 9.1.2, 9.1.3, 9.1.4) (Range 1, 2, 3, 4)
  
2. Monitor and adjust work programmes as the installation progresses, taking into account any changes and variations which arise.  
(PC 9.1.5, 9.1.6) (Range 2)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. How to determine the following for specific jobs:
  - a. Material requirements
  - b. Labour requirements
  - c. Plant and equipment requirements(PC 9.1.1) (Range 1)
2. How to produce basic work programmes in bar chart format to identify key stages in job progress.  
(PC 9.1.2) (Range 2)
3. How to develop work programmes which meet the requirements of customer and/or main contractor work programmes.  
(PC 9.1.2) (Range 2)
4. How to schedule inspection or approval site visits into work programmes.  
(PC 9.1.3) (Range 4)
5. How to specify job payment requirements, which meet, work progress, job contract and business requirements.  
(PC 9.1.4) (Range 3)
6. Typical situations in which the work programme may have to be adjusted and how to obtain approval to adjust the work programme.  
(PC 9.1.5, 9.1.6) (Range 2)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must produce work programmes for a minimum of two work locations which incorporate an entire contract or significant proportion of a contract which may involve new installation or service and maintenance.
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.



**Unit 009**

**Specify programmes for working on RAC systems  
-small commercial refrigeration & air conditioning systems**

Element 9.2

Negotiate job contract terms and conditions

**The candidate must provide evidence to prove that they can:**

**9.2.1 Negotiate and agree contract conditions between** relevant parties <sup>(1)</sup>.

**9.2.2 Specify** contract conditions <sup>(2)</sup> **in an agreed** contract format <sup>(3)</sup>.

**9.2.3 Confirm customer satisfaction with** contract conditions <sup>(2)</sup>.

**9.2.4 Identify and negotiate with** relevant parties <sup>(1)</sup> **changes to the** contract conditions <sup>(2)</sup> **where deviations or modifications prove necessary.**

*Candidates will be required to produce evidence for all range items*

**Range**

**1. Relevant Parties**

- a. Suppliers
- b. Customers

**2. Contract Conditions**

- a. Standard form of contract
- b. Programmes

**3. Contract Format**

- a. Standard form of contract

## Performance Evidence

*Candidates must produce sufficient evidence to demonstrate consistency in their ability to:*

1. Agree contract conditions with relevant parties.  
(PC All) (Range 1, 2, 3)
2. Complete and maintain documentation associated with the installation contract as required by organisational procedures.  
(PC All) (Range 1, 2)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Knowledge Statements

*The candidate must provide evidence that they know:*

1. The basic forms of job agreement applicable to the size of contract:
  - a. Quotations and acceptance letters
  - b. Formal contract documents
  - c. Orders for material supply(PC 9.2.1, 9.2.2, 9.2.3) (Range 1, 2, 3)
2. The circumstances in which deviations or variations to the contract may prove necessary.  
(PC 9.2.4) (Range 1, 2)
3. The actions necessary to obtain agreement with customers or suppliers to deviations or variations to the contract conditions.  
(PC 9.2.3, 9.2.4) (Range 1, 2)

Note: Numbers in brackets allow you to refer back to the relevant performance criteria and range

## Assessment Guidance

### *To assist in assessment of candidates*

1. Performance evidence should be generated from the workplace. A proportion may be produced in a realistic working environment. All performance evidence must be of a commercially acceptable standard.
2. Candidates must:
  - a. Be observed by the assessor or provide witness testimony of their ability to negotiate and agree programmes of work with at least one of the relevant parties listed in the range.
  - b. Produce written records of negotiation as evidence.
3. In addition, candidates must possess sufficient knowledge and understanding across all range and satisfy all performance criteria.