

Summit **SKILLS**

Mechanical Services

National Occupational Standards

March 2008

Important note:

This document contains National Occupational Standards only.

For the delivery of an NVQ, evidence requirements, assessment guidance and an assessment strategy are required.

This document does not contain - and is not intended to contain - any information on either evidence or assessment.

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M1. APPLY HEALTH & SAFETY LEGISLATION AND WORKING PRACTICES

UNIT DESCRIPTOR

This unit is about maintaining a healthy and safe working environment across the range of installation or maintenance work, this involves being able to use safe procedures when working with others and use safe working practices.

The person carrying out this work must possess the skills and knowledge to ensure that their own actions do not create any health and safety risks, they do not ignore hazards with significant risk in the workplace and that they take sensible action to put things right

There are many potential hazards within our industry. This unit is designed to ensure that those that work within it 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.

This unit is about identifying the hazards and risks that are associated with the job. Typically these will focus on the working environment, the tools and equipment that are used, materials and substances that are used, working practices that do not follow laid-down procedures, and manual lifting and carrying techniques.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Identify which workplace health and safety procedures are relevant to their working environment and ensure that they comply with their duties and obligations as defined by current, relevant legislation
2. Present themselves in the workplace suitably prepared for the activities to be undertaken
3. Where appropriate, produce a risk assessment and method statement for the work to be carried out
4. Review their own working practices and working environment for hazards which could cause serious harm, including the handling of potentially hazardous materials, tools and equipment
5. Follow the workplace policies and suppliers' or manufacturers' instructions for the safe use and maintenance of tools, plant and equipment
6. Control those health and safety hazards within their capability and job responsibility limits
7. Report to the relevant persons responsible for health and safety in the workplace, those hazards which may present a high risk
8. Ensure personal conduct around the workplace does not endanger the health and safety of themselves or other persons
9. Follow correct procedures in the event of injuries to self and others
10. Take remedial action(s) where work methods do not comply with risk assessment requirements
11. Demonstrate work processes, production and installation processes which comply with health and risk assessment safety requirements

12. Comply with hazard warning and prohibition notices

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know, understand and apply as appropriate:

- a) The roles and responsibilities of themselves and others under the Health and Safety at Work Act 1974 and other current legislation (e.g. The Management of Health and Safety at Work Regulations; Workplace Health and Safety and Welfare Regulations; Personal Protection at Work Regulations; Manual Handling Operations Regulations; Provision and Use of Work Equipment Regulations; Display Screen at Work Regulations; Construction (Design and Management) Regulations; Control of Noise at Work Regulations; Control of Asbestos Regulations 2006)

The person carrying out this work must know and understand:

- b) The particular health and safety risks which may be present in their own job role (the tools, materials and equipment that they use, not reporting accidental breakages of tools or equipment and not following laid-down working practices and procedures) and the requirements of current health and safety legislation for the range of work operations
- c) How to recognise potential asbestos containing materials in the workplace
- d) The procedures for dealing with a suspected presence of asbestos in the workplace
- e) Public health concerns associated with their workplace
- f) Safe practices when carrying out work
- g) How to locate relevant health and safety information for their tasks, and the sources of expert assistance when help is needed
- h) What constitutes a hazard in the workplace (such as electricity, slippery and uneven surfaces, dust and fumes, handling and transporting, contaminants and irritants, fire, working at height, environment, dangerous occurrences, hazardous malfunctions, improper use and storage of tools and equipment)
- i) The importance of remaining alert to the presence of hazards in the whole work place
- j) The responsible persons to whom to report health and safety matters
- k) Emergency procedures in the workplace, including procedures for summoning emergency services and the information they require, alarm and evacuation procedures, escape routes and fire fighting procedures
- l) The first aid facilities that exist within their work area and within the organisation in general, and the procedures to be followed in the case of accidents involving injury
- m) How to read, understand and work to, or produce, general risk assessments and method statements and how to apply them in the workplace
- n) The warning signs for the seven main groups of hazardous substances defined by Classification, Packaging and Labelling of Dangerous Substances Regulations
- o) Safety precautions including the protective clothing and equipment that is available for their areas of activity

- p) The methods of protecting customer's property within the types of locations in which installation or maintenance work is carried out and how to report damage arising from work operations, should this arise

Important note: According to the Health and Safety at Work Act:

Employers must safeguard so far as is reasonably practicable, the health, safety and welfare at work of all the people who work for them and 'other persons'. This applies in particular to the provision and maintenance of safe plant and systems of work, and covers all machinery, equipment and substances used.

Employees also have a duty under the Act to take reasonable care to avoid harm to themselves or to others by their working practices, and to co-operate with employers and others in meeting statutory requirements. The Act also requires employees not to interfere with or misuse anything provided to protect their health, safety or welfare in compliance with the Act.

The Health and Safety at Work Act 1974 is the main piece of legislation under which nearly all the other regulations are made. It is for this reason that only this piece of legislation is specifically referred to in this Unit.

M2. APPLY ENVIRONMENTAL LEGISLATION, WORKING PRACTICES AND PRINCIPLES (MECHANICAL SERVICES)

UNIT DESCRIPTOR

The unit covers a key area which focuses on the need for the person carrying out the work to adopt a positive attitude to using practices and procedures which protect the environment and promote efficient use of resources.

The person carrying out this work should be aware of the implications for the environment of work processes, and procedures, and where the job specification permits, should ensure that materials used minimise risks to the environment.

The person completing the work should also be aware of appropriate environmental technologies and should be able to advise on how such technologies could be utilised.

They should be aware of how their work relates to the environment and that all waste materials produced as a result of their work and which are their responsibility to dispose of, are dealt with according to current, relevant legislation.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Apply work procedures which are environmentally friendly
2. In accordance with organisational procedures, identify and report materials, products or equipment that could potentially cause damage to the environment
3. Ensure that relevant people are advised of all system or component operating procedures that are intended to protect the environment
4. Handle potentially hazardous materials in a manner which complies with health and safety requirements
5. Follow workplace procedures and current, relevant legislation for the safe handling, storage and disposal of hazardous materials and products
6. Identify working practices that may harm the environment

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know, understand and apply as appropriate:

- a) The current, relevant legislation for dealing with waste (e.g. The Controlled Waste Regulations; Packaging Regulations; The Waste Electrical and Electronic Equipment Regulations (WEEE); The Special Waste Regulations; The Hazardous Waste Regulations)

The person carrying out the work must know and understand:

- b) Where relevant, the Building Regulations (including energy efficiency requirements for new dwellings), the Code for Sustainable Homes, Water Supply Regulations
- c) The potential implications for the environment of the work procedures used in installing or maintaining systems or components
- d) Prefabrication and installation methods that reduce material wastage
- e) The legislation or recommendations governing the safe use and disposal of hazardous materials
- f) The materials and products that are classed as hazardous to the environment and how to identify them
- g) Organisational procedures for the handling and disposal of hazardous materials and products
- h) The materials and products that are classed as recyclable, how to identify them, and organisational procedures for dealing with them
- i) The importance of reporting hazards to the environment that arise from work procedures within the scope of their area of responsibility and of ensuring that appropriate actions are taken
- j) All relevant environmentally friendly materials, products and procedures
- k) The possible uses and basic operating principles of environmental technologies including underfloor heating, solar hot water heating, heat pumps (ground and air source), biomass, combined heat and power (CHP), combined cooling heat and power (CCHP), rainwater harvesting, grey water recycling
- l) The possible uses of other environmental technologies such as solar photo voltaic, wind energy systems, micro hydro
- m) Where appropriate, the planning requirements for the integration of environmental technology within systems in new build situations and as additions to existing buildings
- n) The importance of energy, and where relevant, water, efficiency considerations when selecting systems, equipment or components
- o) The relevant information that needs to be passed to relevant people to ensure the correct and economical use of energy dependant systems
- p) The general advice that can be given on methods of reducing waste of resources, and effecting savings, including environmental technologies

M3. MAINTAIN EFFECTIVE WORKING RELATIONSHIPS

UNIT DESCRIPTOR

This unit identifies the competences needed to contribute to the development and maintenance of positive working relationships with other people, in accordance with organisational requirements. It is about being positive and constructive in dealings with others, keeping others informed about work plans and activities that affect them by using effective communication skills.

This unit covers the responsibilities required to comply with any policies of the organisation such as contributing to and maintaining positive working relationships with other people.

The person carrying out this work should know how they can develop and maintain positive working relationships with relevant people and understand the importance of appearance and behaviour, the feelings and expectations of others, including customers, and effective communications.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Establish and maintain productive working relationships with relevant people, including dealing with disagreements in an amicable and constructive way, so that good relationships are maintained
2. Identify and confirm the needs and expectations of their colleagues and, where appropriate, customers.
3. Greet others in an appropriate way that makes them feel valued and respected
4. Keep others informed about work plans or activities which affect them or their work
5. Respond effectively to requests for job information from relevant people
6. Seek assistance from others in a polite and courteous way without causing undue disruption to normal working activities
7. Respond promptly and willingly when others ask for help or information which fall within the limits of their own job responsibilities and capabilities, referring to the appropriate person when requests for assistance fall outside their area of responsibility
8. Where appropriate, contribute actively to effective team working by co-operating with colleagues, using appropriate methods of communication
9. Identify conflicts which may cause problems to productivity and promptly seek solutions from the responsible person
10. Meet their organisations standards for appearance and behaviour

KNOWLEDGE REQUIREMENTS:

The person carrying out this work must know and understand:

- a) Legislation regarding health and safety, data protection, equal opportunities and regulations that affect the way that products and services are delivered to customers
- b) Industrial, organisational and professional codes of practice and ethical standards that apply
- c) The actions that are necessary to begin, develop and maintain good working relationships
- d) The principles of good working relationships, reasons why working relationships may break down and the action to take to resolve this
- e) The importance of developing positive working relationships with relevant people and maintaining productivity – the effect on morale, productivity and company image
- f) How to deal with problems that could have an adverse effect on relationships
- g) How to respond to those with physical disabilities, learning difficulties and language differences (including dialects and accents)
- h) Their organisation's standards for appearance and behaviour
- i) Their customers' rights including any contractual agreements they have with their organisation
- j) The limits of their own authority, and when they need to seek agreement or permission from others, the roles and responsibilities of different individuals and the management structures within different organisations employing labour
- k) Any organisational targets relevant to their job, their role in meeting them, and the consequences for their organisation if those targets are not met
- l) How to communicate in a clear, polite, confident way, why this is important and the lines of communication that are available to them
- m) The importance of considering and accepting the views and opinions of other people
- n) The implications for their work and organisation of their own actions
- o) The implications for their organisation of not being able to communicate effectively with others, including customers
- p) The types of job information that may be required by others in the workplace, including, where relevant, the need to keep colleagues informed about their work when it might impact on theirs
- q) How to use the key principles of good communication in work situations, including methods of confirming that the communication has been understood

M4. PROVIDE RELEVANT PEOPLE WITH TECHNICAL AND FUNCTIONAL INFORMATION

UNIT DESCRIPTOR

This unit is for people who pass on technical or functional information relating to equipment and components on which they have been working. It is about supplying technical and functional information accurately on appropriate occasions or at handover with the right amount of detail, bearing in mind the level of awareness of the person receiving the information.

It is about identifying who should receive such information, at what level of detail.

It requires that the person carrying out the work complies with, and works within, the policies and procedures of their organisation, and reports any problems to an appropriate person, seeking guidance and instructions from others when necessary.

This unit is about understanding the equipment and/or components and their operation to a depth adequate for carrying out effective familiarisation and demonstration procedures to the required standard.

It includes understanding the needs of a customer and assessing the customer's ability to operate the product. It is important that, where relevant, any Health & Safety aspects are explained to the customer, both for their own protection and for the safe operation of the equipment or components including how to isolate the equipment in the case of emergency and the appropriate contact details should they need further advice or help.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Identify the relevant people, such as customers, that need to be supplied with technical and functional information and ensure they have any other necessary information, such as safety information, how to isolate the product in case of emergency and the person's address or contact details for further advice or help
2. Discuss, with the relevant people, the information they need in order for the systems, equipment or components to be operated safely and effectively
3. Obtain from appropriate sources current and relevant information required for the work
4. Pass on information in a timely, courteous and professional manner and in accordance with organisational procedures
5. Confirm that the supplied product or equipment is the correct one or suitable for the purpose, working to its given specifications, meets the customers expectations and meets all the required safety standards
6. Where relevant, explain and demonstrate the operation of the product to the customer
7. Where relevant, ensure that the customer is able to operate the product and is aware of the necessary health and safety information and advice
8. Clearly identify any unusual features of the condition of the system, equipment or component

9. Where necessary, confirm that relevant people involved accept that the system or equipment is in a satisfactory condition for handover to take place

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) Sources of technical and functional information such as the manufacturer, supplier or own organisation
- b) Responsibilities and limitations in their job role with respect to supplying technical and functional information
- c) The technical and functional information that they are providing and its implications for the operation of equipment and components
- d) The organisational policy regarding the handover and demonstration of a product or equipment
- e) Where appropriate, customer relations methods and procedures
- f) Work site requirements (eg structural, services and ventilation)
- g) Product or equipment operation, controls, settings and adjustments
- h) Waste disposal procedures at the work site
- i) Alternative systems or equipment that could be more appropriate to the relevant person's needs
- j) Which situations warrant written technical and functional information
- k) The importance of providing information clearly, courteously and professionally
- l) The safety implications and functional consequences of supplying inaccurate or incomplete information to the relevant person
- m) Methods of checking the relevant person's understanding of the technical and non-technical information provided, including Health & Safety information
- n) Where necessary, the organisational procedures for confirming and recording handover

M5. OVERSEE THE WORK ENVIRONMENT

UNIT DESCRIPTOR

This unit is about overseeing the work environment, which in some cases might involve overseeing the work of other operatives and/or contractors. The person carrying out this work is responsible for ensuring that the work is effectively coordinated in order to complete the work on time and to the specification.

The person carrying out this work should know the extent of their role and responsibilities, including understanding how best to motivate and communicate with others.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Produce a risk assessment and method statement for the work to be carried out
2. Ensure the risk assessment and method statement includes others working in the area including work colleagues and any other operatives
3. Where appropriate, allocate duties and responsibilities to operatives to make best use of their competence
4. Where relevant, instruct the operatives about their duties and responsibilities clearly and concisely
5. Ensure that all their communications are clear, accurate and appropriate to the situation
6. Where relevant, ensure effective co-ordination with the work of other contractors
7. Where relevant, monitor that the work of operatives is in accordance with working practices and is:
 - safe and fit for purpose
 - cost-effective
 - within the programme of work and complies with industry standards
8. Ensure that safe and appropriate action is taken promptly where a non-compliance is identified during the programme of work
9. Ensure that all documentation is in accordance with the operations and organisational requirements and is legible, accurate and timely
10. Liaise with the responsible person to resolve issues which are outside the scope of their job role
11. Ensure that the work on completion is safe, complies with both the work specification and industry standards

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) Their role and responsibilities (e.g. Health and Safety) towards other staff, employer, customers, any sub-contractors and, where appropriate, when supervising others
- b) Safety requirements with regard to others and their ability to re-schedule work to co-ordinate with their requirements
- c) How to interpret a risk assessment, apply a method statement, and monitor changing conditions in the workplace
- d) Different styles of supervision, how to best motivate others and, where appropriate, oversee the work of operatives for whom they are responsible
- e) Where relevant, how to identify the competence of the operatives for whom they are responsible
- f) Where relevant, how to plan the work allocations, duties and responsibilities of operatives for whom they are responsible
- g) How to communicate with others including operatives and, where appropriate, other staff, employer, customers and any sub-contractors
- h) How to be effective when communicating with and responding to others
- i) The scope for carrying out the work whilst maintaining safety, cost effectiveness and remaining within the programme of work
- j) The relevant industry standards for work carried out in operations
- k) Organisational requirements for completing the necessary documentation and how to ensure clarity, accuracy and completion within schedule
- l) How to identify that the operation on completion is safe and complies with industry standards

M6. ORGANISE THE WORKING ENVIRONMENT

UNIT DESCRIPTOR

This unit is about managing the working environment. It involves discussing with the relevant people a programme of work and estimating the amount of time the work should take to complete.

The person carrying out the work should identify and organise the appropriate resources for the work to be carried out, including identifying suitable alternatives when the most appropriate resources are not available. It also involves ensuring that equipment and components are in a condition fit for the installation or maintenance to be carried out.

This unit also covers ensuring that work is carried out safely and in accordance with the programme of work and industry standards, and making sure that all relevant documentation is completed accurately.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Identify from the work specification what resources (such as materials, plant, vehicles or equipment) are required in order to carry out the work efficiently and, where necessary, identify suitable alternatives
2. Discuss and agree a programme of work which includes, where necessary, effective co-ordination with the work of other contractors and make an accurate estimate of the time the job should take to complete
3. Ensure that all their communications are clear, accurate and appropriate to the situation
4. Confirm that the required amount and type of materials are available for work to commence and be completed cost effectively
5. Ensure that all resources are delivered on time and undamaged by transportation
6. Where appropriate, ensure that there is sufficient and appropriate provision for the safe storage of materials and equipment in the work location
7. Ensure that all documentation is completed in accordance with the operations and organisational requirements and is legible, accurate and timely
8. Liaise with the responsible person to resolve issues which are outside the scope of their job role
9. Ensure that the work on completion is safe, complies with both the work specification and industry standards

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) Their responsibilities to their employer and to their customer
- b) The scope, purpose and requirements of the work operations with which they are involved and for which they are responsible
- c) How to interpret a method statement, a risk assessment and monitor changing conditions in the workplace
- d) How to interpret the work specification to identify the required resources (such as materials, plant, vehicles or equipment)
- e) How to estimate the amount of time for completion of the work and the factors to take into account
- f) How to identify and agree a programme of work from the work specification
- g) How to communicate with others clearly and concisely
- h) The material schedule and how to confirm they have the right type and quantity for work to commence and be completed cost-efficiently
- i) Suitable alternative resources (such as tools, materials, equipment and components)
- j) The transport and storage requirements for all materials and how to manage the available storage in the work location
- k) Organisational requirements for completing the necessary documentation and how to ensure clarity, accuracy and completion within schedule
- l) The relevant industry standards for work carried out in operations
- m) The scope for carrying out the work whilst maintaining safety, cost effectiveness and remaining within the programme of work
- n) The possible consequences of not carrying out the work within the estimated time and to the programme of work
- o) Their job role and its scope and when to involve someone with higher responsibilities
- p) How to identify that the operation on completion is safe and complies with industry standards

M7. PREPARE TO CARRY OUT WORK

UNIT DESCRIPTOR

This unit is for people who make the preparations prior to work being conducted and is relevant to those who prepare for both installation and service and maintenance work.

The person carrying out this work must review the work location to ensure that it is safe for the work to be carried out and that all of the necessary checks and tests have been conducted. This includes checking the work location for any existing damage or defects prior to commencement of the work.

The person carrying out this work must ensure that all the necessary preparations are made so that the work can take place safely and in accordance with current industry standards and regulations.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Carry out a review of the work location and identify factors which will impact on the work
2. Ensure that job information and documentation is current and relevant and that, where relevant, their plant, instrument, equipments, tools and data are fit for purpose, and are of the correct quantity, and size
3. Identify from job information the point(s) within the work process where liaison with other persons will be necessary and identify whom these persons will be
4. Confirm that the relevant people have job information on all key aspects of the work process
5. Seek authorisation from the relevant person(s) prior to commencing work that it is safe to undertake the work as specified
6. Ensure that safety provisions within the immediate work location, including access to it, conform to the requirements of health and safety legislation
7. Report to the job supervisor, or line manager any pre-work damage or defects to existing equipment or building features and confirm that this existed prior to the work commencing
8. Wear suitable personal protective equipment throughout preparation activities
9. Check the external condition of materials for any damage and the quantity against relevant paperwork
10. Carry out preparatory work as necessary

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The legal duties of employers and employees for health and safety as required by the Health and Safety at Work Act 1974 and other relevant legislation appropriate to the work location (e.g. EAWR, Wiring Regulations, COSHH, CDM and Building Regulations)
- b) The regulations and working practices that will affect the work activity such as regulations governing design, installation, operation and routine maintenance, and their intended function
- c) How to carry out an assessment of risks and plan a safe system of work with regard to the work activity
- d) The importance of checking that the work location is safe with regard to access, others working in that location and that permits to work are provided where required
- e) The importance of carrying out visual inspections and tests as well as reviewing the work location for planning purposes to determine the work requirements
- f) The importance of wearing appropriate personal protective equipment (PPE)
- g) How to ensure that the customer is fully briefed on all aspects of the work programme
- h) The importance of protecting property prior to starting work and identifying pre-existing damage to property and building fabric
- i) Whether tools are fit for purpose and that they have a current calibration certificate
- j) How to calculate resource requirements for materials, tools and other equipment
- k) Secure storage procedures for tools, equipment, materials and components – basic stores procedures to ensure security and to minimise loss or wastage
- l) The implications of different working conditions on the equipment and components and/or system

M8. IDENTIFY SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about dealing with a customer identifying their requirements and providing commercially acceptable solutions to them. It covers making changes and alterations required by the customer throughout the work.

It is about assessing the implications, impact and feasibility of alterations and changes to the system.

This unit is also about recognising when variations to the work programme are necessary and knowing how to go about agreeing these, and the relevant people with which to liaise.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Identify and record the customer job requirements
2. Obtain and record information on the work location and features
3. Identify any areas of the proposed system or components where compliance with industry requirements is necessary
4. Identify alternative system options, including environmental technologies, and taking into consideration factors such as efficiency (e.g. energy or water)
5. Explain clearly to relevant people system options which meet identified requirements and those which offer additional benefits such as energy or water efficiency
6. Obtain customer agreement to the proposal
7. Carry out and apply relevant calculations to determine system component requirements
8. Present the system proposal in a manner which enables customer agreement
9. Confirm that the completed system meets requirements
10. Inform the relevant person(s) immediately when changes are necessary before work can commence
11. Record and agree with the relevant person, necessary changes to the work that have cost implications and act on those changes as appropriate

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to obtain information from site drawings and plans
- b) How to carry out a review of the location
- c) The range of documentation detailing industry requirements
- d) How to identify possible proposals which meet the following: customer requirements, site structures and features, and industry requirements
- e) The range of environmentally friendly materials, products, procedures and energy saving devices applicable to their work and the benefits of their use
- f) How to obtain agreement from the customer to progress a selected system proposal
- g) The range of job information that is required to develop proposals for work on new buildings and existing properties
- h) Positioning requirements for components within systems and standard system layouts
- i) How to calculate the requirements of system components – size and specification
- j) Methods of presenting information to customers through the use of drawings, specifications and quotations
- k) The authority and organisational procedures at the site relevant to work plans and changes to the work plans
- l) How to negotiate variations to work programmes, under what circumstances this might be necessary and the need to obtain written acceptance to major work or material variations and the organisational requirements for reporting changes

M9. INSTALL DOMESTIC HEATING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about installing heating systems and components and involves conducting the appropriate soundness testing of systems and components, and the appropriate specified testing procedures during or after the installation of components.

The person carrying out the work must understand how various components relate to each other within the systems being installed.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm that the customer is aware that job information on all key aspects of the installation process is available
2. Confirm that all materials, tools and equipment necessary for the installation process will be available as required
3. Arrange safe storage provision for materials, tools and equipment, which meet industry requirements
4. Confirm that all preparatory work to meet the installation requirements of systems and components has been carried out
5. Confirm that the materials, tools and equipment required for the installation processes are fit for their intended purpose
6. Assemble system components using work methods that conform to industry requirements
7. Position system components to conform to the system design requirement
8. Fix system components using methods that conform to industry requirements
9. Connect system components to systems and input service connections using methods that meet industry requirements.
10. Carry out the installation processes in line with industry requirements, minimising damage to customer property and building features
11. Report to the immediate job supervisor, line manager or customer in accordance with industry requirements any circumstances that affect the progress of the installation
12. Confirm the integrity of the installed system using specified testing procedures
13. Take precautionary actions to prevent the unauthorised use of un-commissioned systems and components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to measure and record site details for installation purposes
- b) The industry practices and work standards for installing system components
- c) The positioning and fixing requirements for system components which conform to the system design and intended functions
- d) The procedures required for connecting to input services or connecting into existing systems
- e) Methods of working which protect the building fabric, customer property and existing systems or components
- f) Job management structures and methods of reporting and recording job progress or problems delaying progress
- g) The care and maintenance requirements of tools and equipment, and the checks required to confirm they are in a safe condition
- h) The range of tests used to confirm the soundness of systems and components and how to use the range of specified testing procedures
- i) What precautionary actions are required during installation and testing

M10. INSTALL PLUMBING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This is about installing plumbing systems and components.

It covers fabricating sections of pipework using the practical skills required by the different materials and systems and measuring work situations to find the lengths and angles of pipe sections required. It is also about installing and checking pipework and other components and applying soundness tests to systems to ensure that there are no leaks.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm that the materials, tools and equipment required for the installation processes are fit for their intended purpose
2. Fabricate system components using work methods that conform to industry requirements
3. Position system components to conform to the system design requirement
4. Fix system components using methods that conform to industry requirements
5. Connect system components to systems and input services using methods that meet industry requirements
6. Carry out the installation processes minimising damage to customer property and building features
7. Report to the immediate job supervisor, line manager, or customer, circumstances that affect the progress of the installation
8. Confirm the integrity of the installed system using soundness testing procedures
9. Take precautionary actions to prevent the unauthorised use of uncommissioned systems and components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to measure and record installation and site details for prefabrication purposes
- b) The industry practices and work standards for fabricating and installing system components
- c) The positioning and fixing requirements for system components to conform to the system design and intended functions
- d) The procedures required for connecting to input services or connecting pipework into existing systems
- e) Methods of working which protect the building décor, customer property and existing systems or components
- f) Job management structures and methods of reporting and recording job progress or problems delaying progress
- g) The care and maintenance requirements of tools and equipment, and checks for safe condition
- h) The range of tests used to confirm the soundness of systems and components and how to use the range of soundness test equipment

M11. INSTALL WEATHERING SYSTEMS

UNIT DESCRIPTOR

This is about installing sheet weathering systems and components.

It covers practical skills required by the different materials and systems and measuring work situations for the installation of sheet leadwork to common weathering situations. This unit is applicable to chimneys, abutments (where a roof surface meets a vertical wall), and to roof penetrations where a soil pipe or other pipe passes through a wall.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm that the materials, tools and equipment required for the installation processes are fit for their intended purpose
2. Fabricate system components using work methods that conform to industry requirements
3. Position system components to conform to the system design requirement
4. Fix system components using methods that conform to industry requirements
5. Connect system components to systems and input services using methods that meet industry requirements
6. Carry out the installation processes minimising damage to customer property and building features
7. Report to the immediate job supervisor, line manager, or customer, circumstances that affect the progress of the installation.
8. Confirm the integrity of the installed system using soundness testing procedures
9. Take precautionary actions to prevent the unauthorised use of uncommissioned systems and components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to measure and record installation and site details for prefabrication purposes
- b) The industry practices and work standards for fabricating and installing system components
- c) The positioning and fixing requirements for system components to conform to the system design and intended functions
- d) The procedures required for connecting to input services or connecting pipework into existing systems
- e) Methods of working which protect the building décor, customer property and existing systems or components
- f) Job management structures and methods of reporting and recording job progress or problems delaying progress
- g) The care and maintenance requirements of tools and equipment, and checks for safe condition
- h) The range of tests used to confirm the soundness of systems and components and how to use the range of soundness test equipment

M12. SERVICE AND MAINTAIN MECHANICAL SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about what is required to service and maintain a range of systems and components in order to satisfy industry requirements.

The person carrying out this work must be able to undertake servicing of appliances for the different systems

They are expected to establish the service and maintenance requirements for the systems and components and carry out service and maintenance of systems and components.

They must be able to service and maintain a range of systems and components, follow instructions and job information, and complete accurate service and maintenance records and schedules.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Carry out service and maintenance activities using procedures which comply with industry requirements
2. Service and maintain system components to ensure continued effective operation of the system
3. Complete records to provide an accurate history of the service and maintenance of system components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to use performance specifications for systems and components, and maintenance procedures necessary to restore or maintain the continued performance of systems and components
- b) The maintenance procedures necessary to ensure compliance with industry requirements for routine and non-routine service and maintenance activities
- c) How to complete records and reports of the maintenance of systems and components
- d) The action to take when the system or component does not work to full performance specification

M13. DECOMMISSION PLUMBING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about de-commissioning plumbing systems and components.

The person carrying out this work must ensure that the appropriate persons are advised of the intention to take the system out of use, and that these persons are advised when the de-commissioning has been completed.

Precautions should be taken to prevent the system or component accidentally being re-activated while de-commissioning is taking place, or while work operations are being carried out.

They must know the layouts of systems and components in order that they can establish the affects of de-commissioning on the activities of other persons and so that notices can be placed at appropriate points to advise that the system is out of use.

They must be able to prove that they are able to safely isolate systems from supplies, and to carry out checks to ensure that the system is safe before proceeding with de-commissioning, or with any work for which the system is being shut down.

Certain systems may contain substances e.g. inhibitors, which could be harmful to health or the environment, and it is important that the person carrying out this work knows how to safely collect and dispose of these.

PERFORMANCE OBJECTIVE

The person carrying out this work must show that they:

1. Liaise with other persons at appropriate points within the de-commissioning process to minimise disturbance to work routines
2. Check that conditions within the system will permit safe de-commissioning
3. Decommission systems or components using tests and procedures, which comply with industry requirements
4. Take precautionary actions to ensure that de-commissioned systems or components do not prove a safety hazard

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The importance of confirming the system design, specification, functions and outcomes of suspending the operation of the system
- b) The need to liaise with others whose procedures or routines may be affected by the suspension of the system operation
- c) The potential hazards that could arise from de-commissioning activities and the checks to be carried out before de-commissioning takes place
- d) The de-commissioning procedures for temporary and permanent de-commissioning of systems
- e) The precautions to ensure that de-commissioned systems do not prove a safety hazard – measures to prevent systems being brought into operation – safety and warning notices
- f) How to safely collect and dispose of system contents that may be hazardous to health or the environment
- g) How to complete systems de-commissioning records

M14. IDENTIFY FAULTS IN PLUMBING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit covers the key areas of maintenance work involving diagnosing the cause of faults in water systems and components. Diagnostic requirements in this unit apply only to system components such as: pipe materials, taps, float valves, isolation valves, shower valves and pumps. It does not include appliances.

The person carrying out this work should be able to locate simple faults in the system or component performance.

PERFORMANCE CRITERIA

The person carrying out this work must show that they:

1. Obtain clear and detailed information about the reported faults including any components which need to be replaced
2. Advise the relevant people clearly and accurately about the potential disruption and consequences of carrying out a diagnosis of faults
3. Locate faults in systems or system components using procedures that comply with industry requirements
4. Report to the relevant person diagnosed faults in systems and components
5. Liaise with other persons to agree fault rectification procedures which will minimise disruption to work routines

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The necessary information for carrying out a successful fault diagnosis
- b) How to interpret information on system or component performance, including advice from users, visual inspections or checks or diagnosis tests to locate faults
- c) The potential disruption and consequences of carrying out a diagnosis of faults
- d) How to liaise with others to ensure co-operation in the fault diagnosis process
- e) The work action and sequences required to diagnose faults in systems and components
- f) The measures to ensure that systems do not present a safety hazard to potential users, or the workforce, when carrying out diagnosis procedures
- g) How to isolate unsafe systems and components
- h) The procedures for reporting diagnosed faults in systems and components

M15. RECTIFY FAULTS IN PLUMBING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about rectifying faults that have been diagnosed in water systems. The rectification requirements of this unit apply to system components such as: pipe materials, taps, float valves, isolation valves, shower valves, pumps, boilers, and control components.

The person carrying out the work should be able to determine the information required, (which may be verbal instructions), and the people who need to be kept informed during the work activities.

They should be able to rectify faults and restore the system or component performance to specification.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Rectify faults in systems to restore the system or component function to performance specification.
2. Take precautionary actions to prevent the unauthorised use of unsafe systems or components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to interpret information on system or component performance, including advice from users, visual inspections or checks or diagnosis tests to locate faults
- b) The work procedures for the rectification of faults in systems or components which will ensure minimum disruption to customers and routines
- c) How to liaise with others to ensure co-operation in the fault rectification process
- d) The work action and sequences required to rectify faults in systems and components
- e) The measures to ensure that systems do not present a safety hazard to potential users, or the workforce, when carrying out rectification procedures
- f) The actions to be taken when the system or component cannot be restored to full performance
- g) How to isolate unsafe systems and components

M16. FIT AND FIX COOLING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about assembling, fitting and fixing cooling systems, equipment and components and involves the ability to make on site decisions, in some cases involving the work of others.

The person carrying out this work must follow industry requirements when conducting the installation activity and ensure that they take the appropriate precautions to avoid causing damage and the customer's property.

This unit is also about working with different types of customer and liaising with clients.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm that the materials, tools and equipment required for the installation processes are fit for their intended purpose
2. Ensure that arrangements are in place for accessing the work area safely
3. Assemble system components using work methods that conform to industry requirements
4. Position system components to conform to the system design requirement
5. Fix system components using methods that conform to industry requirements
6. Connect system components to systems and input services using methods that meet industry requirements
7. Install systems, equipment or components including control and safety equipment in the correct position
8. Adjust, as appropriate, safety and control features
9. Carry out the installation processes following industry requirements while minimising damage to customer property and building features
10. Carry out a visual and manual inspection of the system in accordance with relevant standards
11. Report to the immediate job supervisor, line manager (or customer) circumstances that affect the progress of the installation in line with industry requirements
12. Take precautionary actions to prevent the unauthorised use of un-commissioned systems and components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to measure and record installation and site details for prefabrication purposes
- b) The industry practices and work standards for fabricating and installing system components
- c) The positioning and fixing requirements for system components which conform to the system design and intended functions
- d) How to safely access the work area
- e) The procedures required for connecting to input services or connecting pipework into existing systems
- f) Methods of working which protect the building décor, customer property and existing systems or components
- g) Job management structures and methods of reporting and recording job progress or problems delaying progress
- h) The care and maintenance requirements of tools and equipment, and checks for safe conditions
- i) The range of tests used to confirm the soundness of systems and components and how to use the range of soundness testing equipment
- j) The precautionary actions required during installation and testing
- k) The basic operation of the system and equipment and the risks of leakage associated with it
- l) The potential leakage points in systems equipment
- m) The function and operation of the main components in the system and their role and importance for refrigeration leakage prevention and identification
- n) Basic ISO standards relevant to the system or installation
- o) Basic theory of refrigeration and/or air conditioning systems including thermodynamics
- p) The requirements of EU and UK regulation concerning refrigeration and air conditioning, such as F Gas

M17. SERVICE AND MAINTAIN COOLING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about carrying both planned maintenance and breakdown service. It involves carrying out the work in a variety of contexts and taking on site decisions. In some situations the person carrying out the work will be responsible for the work of others.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm that the information necessary to service and maintain systems and components is available, read and understood
2. Identify the activities that make up the maintenance schedule for the systems and components
3. Plan service and maintenance work on the systems and components to minimise the disruption of system operation
4. Confirm that all materials, tools and equipment necessary for the service and maintenance activities will be available as required
5. Liaise with other persons at appropriate points within the maintenance activities to minimise disruption to work routines
6. Confirm that maintenance activities comply with industry requirements and use procedures in line with these requirements
7. Carry out a visual and manual inspection of the system in accordance with relevant standards
8. Examine equipment records to check for leakage and identify relevant information on any repeating or problem areas
9. Use tables and diagrams to monitor the performance of the system and check for indirect leaks
10. Identify any problems in the functioning of the equipment that could damage the system or lead to refrigerant leakage, should no action be taken
11. Service and maintain system and components to ensure continued effective operation of the system
12. Adjust, as appropriate, safety and control features
13. Complete records to provide an accurate history of the service and maintenance of system components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The range of information that should be available on the routine and non-routine service and maintenance requirements of systems and components
- b) The basic operation of the system and equipment and the risks of leakage associated with it
- c) The potential leakage points in systems equipment
- d) The function and operation of the main components in the system and their role and importance for refrigeration leakage prevention and identification
- e) Basic ISO standards relevant to the system or installation
- f) Basic theory of refrigeration and/or air conditioning systems including thermodynamics
- g) The requirements of EU and UK regulation concerning refrigeration and air conditioning, such as F Gas
- h) The service and maintenance procedures across the range of systems and components
- i) How to plan service and maintenance procedures to minimise interference with system operation and customer routines
- j) How and when to liaise with others during service and maintenance activities
- k) The materials required for routine maintenance and the sources of information on the materials required for structured servicing operations
- l) The tools and equipment required for routine maintenance and structured servicing operations
- m) 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
- n) The service and maintenance procedures necessary to ensure compliance with industry requirements for routine and non-routine service and maintenance activities
- o) How to complete records and reports on the service and maintenance of systems and components
- p) The action to take when the system or component does not work to full performance specification

M18. DECOMMISSION COOLING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about decommissioning systems and involves making arrangements with the persons responsible for the work location for the safe recovery and disposal of system fluids and components. The person carrying out the work must be aware of the effect isolating part of a system has on the full system.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Liaise with other persons at appropriate points within the commissioning process to minimise disturbance to work routines
2. Check that conditions within the systems or components will permit safe de-commissioning
3. Identify any problems in the functioning of the equipment that could damage the system or lead to refrigerant leakage, should no action be taken
4. Decommission systems or components using tests and procedures that comply with industry requirements
5. Take precautionary actions to ensure that decommissioned systems or components do not prove a safety hazard

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The importance of confirming the system design, specification, functions and outcomes of suspending the operation of the system
- b) The basic operation of the system and equipment and the risks of leakage associated
- c) The potential leakage points in systems equipment
- d) The function and operation of the main components in the system and their role and importance for refrigeration leakage prevention and identification with it
- e) Basic ISO standards relevant to the system or installation
- f) Basic theory of refrigeration and/or air conditioning systems including thermodynamics
- g) The requirements of EU and UK regulation concerning refrigeration and air conditioning, such as F Gas
- h) The need to liaise with others whose procedures or routines may be affected by the suspension of the system operation
- i) The potential hazards that could arise from de-commissioning activities and the checks to be carried out before de-commissioning takes place

- j) De-commissioning procedures for temporary and permanent de-commissioning of systems
- k) The precautions to ensure that de-commissioned systems do not prove a safety hazard – measures to prevent systems being brought into operation – safety and warning notices
- l) How to safely collect and dispose of system contents that may be hazardous to health or the environment
- m) How to complete systems de-commissioning records

M19. COMMISSION COOLING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about checking that components are installed correctly, bringing the system into operation and ensuring that it operates effectively. It applies to a range of contexts that will in some cases involve responsibility for the work of others.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Ensure that the design requirement on the system or component performance is available
2. Liaise with other persons at appropriate points within the commissioning process to minimise disturbance to work routines
3. Carry out a visual and manual inspection of the system in accordance with relevant standards
4. Check the correct function of system or components against performance requirements
5. Carry out relevant tests to check the strength and tightness of the system, using appropriate methods and equipment
6. Adjust, as appropriate, safety and system controls to establish system or component meet design specification
7. Start up and shut down the system and check that the system or equipment is functioning correctly
8. Provide the customer with information necessary to the continuing operation of the system or component

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The sources of information on the performance of systems or components
- b) The basic operation of the system and equipment and the risks of leakage associated
- c) The potential leakage points in systems equipment
- d) The function and operation of the main components in the system and their role and importance for refrigeration leakage prevention and identification with it
- e) Basic ISO standards relevant to the system or installation
- f) Basic theory of refrigeration and/or air conditioning systems including thermodynamics
- g) The requirements of EU and UK regulation concerning refrigeration and air conditioning, such as F Gas

- h) The procedures for establishing correct system or component performance and checking against the design specification
- i) The routines and sequences for commissioning systems or components
- j) The points in the commissioning process where co-operation and liaison with other trades and customers may be required
- k) Sources of user information appropriate to different systems and components
- l) How to complete commissioning documentation confirming the safe commissioning of systems and components
- m) System handover procedures and demonstrating the operation of systems and components to end-users
- n) The actions to take when components being commissioned do not meet design requirements

M20. IDENTIFY AND RECTIFY FAULTS IN COOLING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about identifying and rectifying faults in a range of systems. It involves diagnosing mechanical faults with the systems and electrical faults within the main systems including both the main electrical isolator and electronic components.

It will involve liaising with different types of customer and a range of clients.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Diagnose faults in systems or components using procedures that comply with industry requirements
2. Liaise with other persons to agree fault rectification procedures which will minimise disruption to work routines
3. Rectify faults in systems to restore the systems or components function to performance specification
4. Take precautionary actions to prevent the unauthorised use of unsafe systems or components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to interpret information on system or component performance in order to locate faults, including feedback from users, visual inspections, checks or diagnostic tests
- b) The work procedures for the rectification of faults in systems or components, which will ensure minimum disruption to customers and routines
- c) How to liaise with others to ensure co-operation in the fault rectification process
- d) The work actions and sequences required to rectify faults in systems and components
- e) The measures to ensure that systems do not present a safety hazard to potential users, or damage the workplace environment, when carrying out rectification procedures
- f) The actions to be taken when the system or component cannot be restored to full performance
- g) How to isolate unsafe systems and components

M21. INSTALL INDUSTRIAL AND COMMERCIAL HEATING & VENTILATING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about installing heating systems and components and involves conducting the appropriate soundness testing of systems and components, and the appropriate specified testing procedures during or after the installation of components.

The person carrying out the work must understand how various components relate to each other within the systems being installed.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm that the customer is aware that job information on all key aspects of the installation process is available
2. Confirm that all materials, tools and equipment necessary for the installation process will be available as required
3. Arrange safe storage provision for materials, tools and equipment, which meet industry requirements
4. Confirm that all preparatory work to meet the installation requirements of systems and components has been carried out
5. Confirm that the materials, tools and equipment required for the installation processes are fit for their intended purpose
6. Assemble system components using work methods that conform to industry requirements
7. Position system components to conform to the system design requirement
8. Fix system components using methods that conform to industry requirements
9. Connect system components to systems and input service connections using methods that meet industry requirements
10. Carry out the installation processes in line with industry requirements, minimising damage to customer property and building features
11. Report to the immediate job supervisor, line manager or customer in accordance with industry requirements any circumstances that affect the progress of the installation
12. Confirm the integrity of the installed system using specified testing procedures
13. Take precautionary actions to prevent the unauthorised use of un-commissioned systems and components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to measure and record site details for installation purposes
- b) The industry practices and work standards for installing system components
- c) The positioning and fixing requirements for system components which conform to the system design and intended functions
- d) The procedures required for connecting to input services or connecting into existing systems
- e) Methods of working which protect the building fabric, customer property and existing systems or components
- f) Job management structures and methods of reporting and recording job progress or problems delaying progress
- g) The care and maintenance requirements of tools and equipment, and the checks required to confirm they are in a safe condition
- h) The range of tests used to confirm the soundness of systems and components and how to use the range of specified testing procedures
- i) What precautionary actions are required during installation and testing

M22. SERVICE INDUSTRIAL AND COMMERCIAL HEATING & VENTILATING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about what is required to service and maintain systems and components in order to satisfy industry requirements. The maintenance requirements in this unit apply only to system components. It does not include appliances.

The unit covers key areas of maintenance work, establishing maintenance requirements for systems and components and carrying out the maintenance required.

The person carrying out this work should determine the information required, (which may be instructions), the tools and equipment for the maintenance activities and the people who need to be kept informed during the work activities.

They must be able to maintain a range of systems and components, following instructions and job information, and complete accurate maintenance records and schedules.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm that the information necessary to maintain system components is available
2. Identify the activities that make up the maintenance schedule for the system components
3. Plan maintenance work to minimise the disruption of system operation
4. Confirm that all materials, tools and equipment necessary for the maintenance activities will be available as required
5. Liaise with other persons at appropriate points within the maintenance activities to minimise disruption to work routines
6. Confirm that maintenance activities comply with industry requirements
7. Carry out maintenance activities using procedures which comply with industry requirements
8. Service and maintain system components to ensure continued effective operation of the system
9. Complete records to provide an accurate history of the maintenance of system or component

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The range of information that should be available on the routine and non-routine service and maintenance requirements of systems and components
- b) The maintenance procedures across the range of systems and components
- c) How to plan maintenance procedures to minimise interference with system operation and customer routines
- d) How and when to liaise with others during maintenance activities
- e) The materials required for routine maintenance
- f) The tools and equipment required for routine maintenance operations
- g) How to use performance specifications for systems and components, and maintenance procedures necessary to restore or maintain the continued performance of systems and components
- h) The maintenance procedures necessary to ensure compliance with industry requirements for routine and non-routine maintenance activities
- i) How to complete records and reports of the maintenance of systems and components
- j) The action to take when the system or component does not work to full performance specification

M23. MAINTAIN INDUSTRIAL AND COMMERCIAL HEATING & VENTILATING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about what is required to service and maintain systems and components in order to satisfy industry requirements. The maintenance requirements in this unit apply only to system components. It does not include appliances.

The unit covers key areas of maintenance work, establishing maintenance requirements for systems and components and carrying out the maintenance required.

The person carrying out this work should determine the information required, (which may be instructions), the tools and equipment for the maintenance activities and the people who need to be kept informed during the work activities.

They must be able to maintain a range of systems and components, following instructions and job information, and complete accurate maintenance records and schedules.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Carry out maintenance activities using procedures, which comply with industry requirements
2. Service and maintain system components to ensure continued effective operation of the system
3. Complete records to provide an accurate history of the service and maintenance of system components

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) How to do performance specifications for systems and components and the routine maintenance procedures necessary to restore or maintain the continued performance of systems and components
- b) The routine maintenance procedures necessary to ensure compliance with industry requirements
- c) Organisational procedures and documentation required, manufacturers' recommendations and statutory regulations applicable
- d) Appropriate tests, how they relate to each other and how to interpret test results and manufacturers' instructions
- e) The purpose and function of relevant components/principal components and how they relate to each other
- f) The operating principles of gas, oil and solid fuel boilers and the differences between them for maintenance activity
- g) Safe operating pressures and temperatures

- h) Lubricants and cleansing agents, correct type, consequences of using wrong type and safety procedures for handling and use
- i) Causes of corrosion, erosion and acidity and methods of location
- j) Colour coding for identification of pipework and, where relevant, wiring
- k) Need to ensure customer is aware of system isolation and the need to avoid disruption to customer's activity
- l) How to complete records and reports of routine maintenance of systems and components
- m) The actions to take when the system or component does not work to full specification

M24. SERVICE AND MAINTAIN DUCTWORK SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about what is required to service and maintain ductwork systems and components in order to satisfy industry requirements.

It involves the cleaning and maintenance of ductwork and ductwork ancillaries.

The person carrying out the maintenance must be able to maintain a range of systems and components, following instructions and job information, and complete accurate maintenance records and schedules.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Carry out maintenance activities using procedures which comply with industry requirements
2. Service and maintain system components to ensure continued effective operation of the system
3. Complete records to provide an accurate history of the maintenance of system or component

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) 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
- b) The service and maintenance procedures necessary to ensure compliance with industry requirements for routine and non-routine service and maintenance activities, including:
 - The function of turning fan blades and operating fire dampers
 - Requirements for checking and maintaining turning valves
- c) How to complete records and reports of the service and maintenance of systems and components
- d) The action to take when the system or component does not work to full performance specification
- e) The importance of minimising disruption to the customer

M25. INSPECT AND TEST MECHANICAL SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about to carrying out pre-commissioning checks and tests on systems.

The person carrying out the work must be able to undertake the various checks and tests necessary before the system is brought into operation.

They are required to check the operation and correct position of components. They must also carry out tests to ensure there are no leaks and undertake cleaning or flushing of the system.

In the case of ductwork, there is a specified, permissible level of air leakage.

It is important that they are aware of the effect that isolating part of a system has on the full system.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm that the system or components installation complies with industry requirements
2. Check that input services to the system components are suited to their intended purpose
3. Check system or components for soundness using procedures that comply with industry requirements
4. Carry out pre-commissioning tests and checks in accordance with industry requirements
5. Check that the system cleanliness, additives and charging comply with industry requirements

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The procedures, equipment and legislative requirements for applying specified tests to systems
- b) The methods of establishing that input services adequately supply all components within the system
- c) The methods of connecting components to systems
- d) The actions to take where pre-commissioning checks or tests reveal basic or complex system or component defects
- e) How to complete pre-commissioning documentation confirming the safe pre-commissioning of systems and components

M26. DECOMMISSION HEATING & VENTILATING SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about de-commissioning systems, ready for further work or long-term isolation. If the system is to be permanently de-commissioned, this may involve the removal of components.

The person carrying out the work is also required to make arrangements with users of the work location and ensure their safety throughout the process.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Liaise with other persons at appropriate points within the de-commissioning process to minimise disturbance to work routines
2. Check that conditions within the systems or components will permit safe de-commissioning
3. De-commission systems or components using tests and procedures which comply with industry requirements
4. Take precautionary actions to ensure that de-commissioned systems or components do not prove a safety hazard
5. Check that the de-commissioned systems and components are left safe, in line with industry requirements

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The importance of confirming the system functions, and the outcomes of suspending the operation of the system
- b) The need to liaise with others whose procedures or routines may be affected by the suspension of the system operation
- c) The potential hazards that could arise from de-commissioning activities and the checks to be carried out before de-commissioning takes place
- d) De-commissioning procedures for temporary and permanent de-commissioning of systems, including organisational requirements
- e) The precautions to ensure that de-commissioned systems do not prove a safety hazard, and the necessary measures to prevent systems being brought into operation, including using the correct safety and warning notices
- f) How to safely collect and dispose of system contents that may be hazardous to health or harmful to the environment
- g) How to complete systems de-commissioning records

- h) System contents requiring recovery for re-use or disposal
- i) The operating and working principles of the system to be decommissioned
- j) What action to take when normal emptying or shut off mechanisms do not operate

M27. COMMISSION MECHANICAL SYSTEMS

UNIT DESCRIPTOR

This unit is about commission systems following the appropriate pre-commissioning tests and checks being carried out.

It is about bringing the system into operation and ensuring it operates effectively as intended.

The person carrying out this work is required to check that components are installed correctly, ensure there are no leaks and undertake cleaning and flushing.

For ductwork there is a specified permissible level of air leakage. It is not intended that they meet the demands of commissioning specialists. As a guide, they should be able to operate on heating systems with an input of up to 60kW for domestic installation and 150kW for industrial and commercial.

It is important that they are aware of the effect that isolating part of a system has on the full system.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Ensure that the necessary information on the system or component performance is available
2. Liaise with other persons at appropriate points within the commissioning process to minimise disturbance to work routines
3. Check the correct function of systems or components against performance requirements
4. Adjust system controls to establish that system components meet design specification
5. Provide the customer with information necessary to the continuing operation of the system or component

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The sources of information on the performance of systems or components
- b) The procedures for establishing correct system or component performance and checking against the job specification
- c) The routines and sequences for commissioning systems or components
- d) The points in the commissioning process where co-operation and liaison with other trades and customers may be required
- e) Where to access user information appropriate to different systems and components
- f) How to complete commissioning documentation confirming the safe commissioning of systems and components

- g) System handover procedures and demonstrating the operation of systems and components to end-users
- h) The actions to take when components being commissioned do not meet performance requirements

M28. IDENTIFY FAULTS IN MECHANICAL SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit covers the key areas of maintenance work involving diagnosing the cause of faults in systems and components. Diagnostic requirements in this unit apply only to system components. It does not include appliances.

The person carrying out this work should be able to locate simple faults in the system or component performance.

PERFORMANCE CRITERIA

The person carrying out this work must show that they:

1. Obtain clear and detailed information about the reported faults including any components which need to be replaced
2. Advise the relevant people clearly and accurately about the potential disruption and consequences of carrying out a diagnosis of faults
3. Locate faults in systems or system components using procedures that comply with industry requirements
4. Report to the relevant person diagnosed faults in systems and components
5. Liaise with other persons to agree fault rectification procedures which will minimise disruption to work routines

KNOWLEDGE REQUIEREMENTS

The person carrying out this work must know and understand:

- a) The necessary information for carrying out a successful fault diagnosis
- b) How to interpret information on system or component performance, including advice from users, visual inspections or checks or diagnosis tests to locate faults
- c) The potential disruption and consequences of carrying out a diagnosis of faults
- d) How to liaise with others to ensure co-operation in the fault diagnosis process
- e) The work action and sequences required to diagnose faults in systems and components
- f) The measures to ensure that systems do not present a safety hazard to potential users, or the workforce, when carrying out diagnosis procedures
- g) How to isolate unsafe systems and components
- h) The procedures for reporting diagnosed faults in systems and components
- i) How to interpret information on system or component performance, including advice from users, visual inspections, checks or performance tests to locate faults
- j) The work procedures for the rectification of faults in systems or components which will ensure minimum disruption to customers and routines

- k) How to identify common faults of principal components within systems
- l) Component/principal components and system operation principles
- m) The operating principles of gas, oil and solid fuel boilers and the differences between them for rectification purposes
- n) Effects of component faults upon overall system performance and correct methods to ascertain component fault
- o) How to access and interpret specifications, drawings and technical data relevant to system layout, design and component/principal components function
- p) Organisational and maintenance contract procedures, their purpose and application

M29. RECTIFY AND MODIFY MECHANICAL SYSTEMS, EQUIPMENT AND COMPONENTS

UNIT DESCRIPTOR

This unit is about being able to rectify faults in systems and components, including modification and re-commissioning.

The person carrying out this work must demonstrate a sound knowledge and understanding of system operating principles and the main types of modifications and rectification activities applicable.

It is vital that the relevant electrical tests are carried out and that whilst undertaking diagnostic tasks, compliance with relevant recommendations and regulations is demonstrated.

Mains supplies and energy sources must be traced, located and identified and electrical connections must be safely isolated and disconnected at the appropriate stage in the process.

The person carrying out this work must be aware of the effect isolating part of a system has to the full system status.

Systems are required to be rectified and/or modified using diagnostic skills to restore specified operational performance.

They must be able to undertake the required rectification or modification safely to meet the relevant recommendations, regulations and standards. Relevant documentation is to be completed and made available in line with company procedures if applicable.

For de-commissioning, they must make arrangements with users of the work location and ensure their safety throughout the process.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Carry out rectifying and modifying actions to minimise risk to individuals and the environment
2. Carry out rectifying and modifying actions to minimise system downtime
3. Carry out rectifying and modifying actions in agreement with the customer
4. Isolate systems or partial systems from supply services in accordance with industry requirements
5. Carry out rectifying and modifying actions appropriate to the systems and components
6. Rectify effective system performance to industry requirements
7. Implement rectification and modifying actions that maintain the overall specified system performance
8. Complete documentation that is complete, accurate, and legible and made available to the customer

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) The source of information on the preparatory work necessary for the system or component rectification
- b) The importance of minimising risks to individuals and the environment
- c) How to carry out work efficiently, logically and in line with customer requirements
- d) Why relaying information to the customer and gaining agreement is important
- e) Correct methods and procedures for isolating mains supplies, energy sources and electrical connections
- f) Correct methods and procedures for emptying systems or parts of systems
- g) Working principles of systems within the range
- h) The operating principles of gas, oil and solid fuel boilers and their differences in relation to rectifying and modifying systems
- i) How to compare technical performance of replacement components to faulty components/principal components
- j) Correct installation requirements and procedures for components/principal components of systems, implications of incorrect fixing and different methods of fixing and connecting
- k) How to ascertain components/principal components are electrically safe
- l) How to ensure that overall system performance is not impaired following rectification and modification works

M30. PREPARE RESOURCES FOR PIPE JOINTING ACTIVITIES

UNIT DESCRIPTOR

This involves being able to prepare work areas, materials and equipment to undertake pipe jointing. It involved ensuring that others using the work area are safe and aware of possible disruption, and that the work area is properly protected.

The person carrying out this work must ensure that the equipment they are using is appropriate to the job, in correct operating order and set up correctly to carry out the required work.

Preparation of materials includes jointing consumables and pipework. This unit is applicable to those preparing and aligning joints using cutting, expanding, flaring, hydraulic, compression and abrasive techniques, and propane, butane, oxy-acetylene and/or high temperature gas flame.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. Ensure that the work environment is suitable for the work activities to be undertaken
3. Obtain all the required equipment and materials and ensure that they are suitably prepared for the activities to be carried out
4. In line with work requirements, prepare the work area for the storage of materials and finished products
5. Ensure that all necessary service supplies are connected and ready for use
6. Make sure that required safety arrangements are in place to protect other workers from activities likely to disrupt normal working
7. Inform the appropriate people when preparations are completed
8. Deal promptly and effectively with problems within their control and report those that cannot be solved
9. Report completion of preparations in-line with organisational procedures

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) Health and safety legislation, regulations and safe working practices and procedures
- b) Work area preparation requirements and methods
- c) Types of equipment necessary to undertake jointing activities safely
- d) How to identify necessary materials and recognise defects
- e) Safe materials handling and preparation methods and techniques
- f) Tools and equipment care and control procedures
- g) Organisational reporting lines and procedures

M31. CONNECT PIPEWORK

UNIT DESCRIPTOR

This unit is applicable to those that join pipework by brazing, soldering, welding or mechanical means to meet specifications and establish compliance with pipework jointing specifications.

The person carrying out this work is required to undertake the jointing process for different types of joints, in various positions and to conduct visual inspections and checks of the completed work.

The activities involved include connecting pipework joints using cutting, expanding, flaring, hydraulic, compression and abrasive techniques, and propane, butane, oxy-acetylene and/or high temperature gas flame.

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. Follow the relevant joining procedures and job instructions for completion and checking of work
3. Check that the joint preparation complies with the specification
4. Check that joining and related equipment and consumables are as specified and fit for the purpose
5. Make the joints as specified using the appropriate joining technique
6. Produce joints of the required quality and of specified dimensional accuracy
7. Where appropriate, shut down the equipment to a safe condition on completion of joining activities
8. In line with approved and agreed procedures, deal promptly with excess and waste materials and temporary attachments
9. Deal promptly and effectively with problems within their control and report those that cannot be solved
10. Use all the correct tools and inspection equipment and check that they are in useable condition
11. Carry out checks on completed work in an appropriate sequence using approved methods and procedures
12. Identify and assess any defects or variations from the specification and take appropriate action
13. Report completion of compliance activities in line with organisational procedures

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) Health and safety legislation, regulations, safe working practices and procedures relevant to the work being carried out
- b) Jointing specifications and joining procedures for the work being carried out
- c) How to interpret engineering drawings and related specifications
- d) Jointing processes and equipment relevant to the specification
- e) Safe material handling, preparation, finishing methods and techniques
- f) Appropriate materials and their joining characteristics
- g) Setting, operating and care procedures for the equipment being used
- h) Appropriate personal approval tests and how to conduct them safely
- i) Hazards arising from joining operations
- j) Appropriate compliance checking methods and techniques
- k) How to identify defects in products and assets
- l) Organisational reporting lines and procedures
- m) Organisational and regulatory quality control systems and documentation procedures
- n) Inspection equipment care and control procedures

M32. ESTABLISH ELECTRICAL CONTROL (AND SUPPLY) OF MECHANICAL BUILDING SERVICES SYSTEMS

UNIT DESCRIPTOR

This unit is for people who are required to install, maintain and service electrical systems which are designed to control;

- Refrigeration
- Air Conditioning
- Heating
- Ventilation
- Hot and Cold water

This unit is about following the correct procedures for the installation, maintenance and servicing of mechanical building services systems and complying with the relevant regulations, codes of practice and industry approved standards.

They need to show an understanding of safe isolation procedures and risk assessment, wiring/cable systems, fault finding techniques, types and limitations of earthing and overcurrent protection systems and equipment, electrical supply systems, methods and limitations of functional testing and have the technical competence to interpret diagrams, drawings and specifications as appropriate.

By the very nature of the hazardous working environment and working conditions it is important to remember that the activities undertaken by the *operative* shall:

- be approved in accordance with accepted industrial practice and standards
- be to an appropriate specification as issued by the person responsible for the completion of the installation
- not involve testing and commissioning of the complete installation and its constituent parts
- have the authority to take decisions about the work they undertake such as the selection of suitable and safe *access equipment, tools and equipment* needed to complete the work they undertake
- have the responsibility for ensuring the work they undertake when completed, is as specified and in accordance with approved industrial practices and standards
- work on their own and have the responsibility for identifying, communicating and co-operating with, as necessary, technical and non-technical persons when appropriate

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Confirm the existing electrical supply is compatible with the electrical control system and in accordance with relevant regulations, specifications and organisational procedures
2. Follow agreed procedures to ensure the co-ordination of site services and the activities of other trades
3. Identify and carry out isolation procedures to ensure a safe installation in accordance with electrical regulations and approved procedures as and when required
4. Undertake relevant risk assessments and record the outcome in keeping with organisational procedures
5. Install, terminate and connect identified cables and wiring systems in accordance with industry approved methods and practices
6. Install and connect identified electrical control system components in accordance with industry approved methods and practices
7. Identify and rectify faults in accordance with industry approved methods and practices and organisational procedures
8. Identify and confirm fit for purpose instruments and equipment to undertake functional testing
9. Undertake functional testing in accordance with industry approved methods and practices and organisational procedures
10. Interpret diagrams, drawings, technical data and specifications as appropriate
11. Provide technical and functional information to relevant people in accordance with organisational procedures

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) IEE Wiring Regulations; Electricity at Work Regulations; Building Regulations, as relevant
- b) Procedures of safe isolation in accordance with current standards and regulations
- c) The types, application, strengths and limitations of wiring systems and cables
- d) The types, application, strengths and limitations of cable termination and connection methods
- e) The types, application, strengths and limitations of circuits and electrical supply for identified electrical control systems
- f) The types, application, strengths and limitations of earthing and overcurrent protection systems and components
- g) Methods and techniques of fault finding and rectification in accordance with industry approved standards and practices
- h) The types, application, strengths and limitations of equipment and instruments used for functional testing
- i) Methods and techniques of functional testing in accordance with industry regulations, procedures and practices
- j) The types and application of electrical drawings, diagrams and specifications
- k) The purpose and significance of relevant documentation in accordance with industry requirements
- l) The purpose and significance of following organisational and industry procedures when interpreting and providing relevant technical and functional information

Health and Safety

- m) The correct procedures for a safe isolation with regard to an assessment of safe working practice, the correct identification of circuits to be isolated, the correct test and proving instruments selected, the use of correct testing methods, and correct selection of devices for securing isolation
- n) The implications for relevant parties of carrying out an isolation
- o) The importance of using personal protective equipment and safe, appropriate tools for specific jobs
- p) The hazards associated with using electrical equipment and plant including their lifting, handling and fixing

Principles and theory

- q) IEE wiring regulations as specified in the latest British Standard for Electrical Installations relevant to types and uses of wiring systems, wiring enclosures and equipment
- r) Where to find out about the principles of electrical theory which allow for the safe installation of electrical wiring systems, wiring enclosures and equipment

M33 CARRY OUT SAFE ELECTRICAL WORKING PRACTICES ON ELECTRICAL CONTROL (AND SUPPLY) FOR MECHANICAL BUILDING SERVICES SYSTEMS

UNIT DESCRIPTOR

This unit is for people who are required to disconnect and/or dismantle systems and components with an electrical supply for,

- Refrigeration
- Air Conditioning
- Heating
- Ventilation
- Hot and Cold water

This unit is about following the correct procedures when making safe mechanical building services systems/components/equipment for disconnection from an electrical supply, using methods and practices compliant with the relevant regulations, codes of practice and industry approved standards.

They need to show an understanding of safe isolation procedures, risk assessment and methods of determining the presence or not of an electrical supply.

By the very nature of the hazardous working environment and working conditions it is important to remember that the activities undertaken by the operative shall;

- be approved in accordance with accepted industrial practice and standards
- not involve the installation and connection of electrical equipment and components
- not involve testing and commissioning of the complete installation and its constituent parts
- have the authority to take decisions about the work they undertake such as the selection of suitable and safe access equipment, tools and equipment needed to complete the work they undertake
- work on their own and have the responsibility for identifying, communicating and co-operating with, as necessary, technical and non-technical persons when appropriate

PERFORMANCE OBJECTIVES

The person carrying out this work must show that they:

1. Follow agreed procedures to ensure the co-ordination of site services and the activities of other trades as relevant
2. Identify and carry out isolation procedures to ensure the safe installation of system and components in accordance with electrical regulations and approved procedures as and when required
3. Undertake relevant risk assessments and record the outcome in keeping with organisational procedures
4. Identify and confirm fit for purpose instruments and equipment for determining the presence or not of an electrical supply
5. Confirm the presence or not of an electrical supply in accordance with electrical regulations and approved procedures
6. Interpret relevant technical data and specifications as appropriate

KNOWLEDGE REQUIREMENTS

The person carrying out this work must know and understand:

- a) IEE Wiring Regulations; Electricity at Work Regulations; Building Regulations as relevant
- b) Procedures of safe isolation in accordance with current standards and regulations
- c) The types, application, strengths and limitations of circuits and electrical supply for identified electrical control systems
- d) The types, application, strengths and limitations of equipment and instruments used for determining the presence or not of an electrical supply
- e) Methods and techniques of confirming the presence or not of an electrical supply in accordance with industry regulations, procedures and practices
- f) Types and application of electrical drawings, diagrams and specifications
- g) The purpose and significance of relevant documentation in accordance with industry practices and procedures
- h) The purpose and significance of following organisational and industry procedures when interpreting and providing relevant technical and functional information

Health and Safety

- i) The correct procedures for a safe isolation with regard to an assessment of safe working practice, the correct identification of circuits to be isolated, the correct test and proving instruments selected, the use of correct testing methods, and correct selection of devices for securing isolation
- j) The implications for relevant parties of carrying out an isolation

- k) The importance of using personal protective equipment and safe appropriate tools for specific jobs
- l) The hazards associated with using electrical equipment and plant including their lifting, handling and fixing

Principles and theory

- m) IEE wiring regulations as specified in the latest British Standard for Electrical Installations relevant to types and uses of wiring systems, wiring enclosures and equipment
- n) Where to find out about the principles of electrical theory which allow for the safe installation of electrical wiring systems, wiring enclosures and equipment