Level 2 Progression Award in Electrical and Electronics Servicing – Domestic Electrical Appliances (6958-02)

Qualification handbook

City & Guilds

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Summary of requirements

Progression Award in Electrical and Electronics Servicing: Domestic Electrical Appliances

Candidates entering for this award can achieve a certificate – *Progression Award: Electrical and Electronics Servicing (Domestic Electrical Appliances) Level 2*.

The award consists of core and optional units. In order to gain the certificate, candidates must successfully complete the **five** core units and **one** optional unit.

Core units

1 d.c. principles, components and applications
2 a.c. mains power and applications
3 a.c. motors for domestic applications
4 Controllers and components
5 Mechanical services and components

Options

6 Home laundry appliances and domestic washers
7 Cooking appliances (including microwave cookers)
8 Refrigeration systems and portable air conditioning systems

Each candidate must complete nine assessment components:

- one assignment for each core unit (five in total)
- one assignment for the chosen optional unit
- two multiple choice question papers, covering the five core units
- one multiple-choice question paper for the chosen optional unit.

For further information on assessment and certification issues, please see **Entry for assessment and certification**, page 09.

The assignments are provided by City & Guilds. For information on assignments, see **Assignments**, page 11.

Multiple choice papers are provided as dated examinations. For further information please see **Multiple Choice papers**, page 11.

Key skills must be delivered as appropriate through the work for each unit. Further guidance will be issued once the criteria for Key Skills have been revised by QCA.

Section 1
General information

Rationale – what are Progression Awards?

Each Progression Award is intended to provide some or all of the knowledge and understanding required for the related N/SVQs. These awards are expressed as units and based on the redevelopment and updating of traditional City & Guilds vocational qualifications, each of which has a related City & Guilds N/SVQ. In some cases (such as Information Technology and Engineering), the traditional qualification is much broader than the NVQ, and a number of Progression Awards are likely to be needed for different specialisms.

These new qualifications have been developed as a response to several reviews which were undertaken for Government during 1996. The Dearing review focussed on post-16 education, the Beaumont review on N/SVQs and the Capey review on GNVQs. As a result, a new National Framework of qualifications was formulated, highlighting the need for a new type of qualification which would promote progression and transfer between different qualification routes. Overall, there is a need to encourage and promote progression and transfer between different families of qualifications (N/SVQ, GNVQ and A level).

Progression Awards will increase opportunities for individuals who are attempting to enter the industry, unemployed or in small/medium-sized enterprises to achieve N/SVQs, as well as reducing the burden on employers in terms of assessment. They may also encourage the formation of partnerships between FE colleges and training providers.

Progression Awards will facilitate access to N/SVQs since they do not require workplace assessment. External assessment is provided in the form of multiple-choice or short-answer questions, in addition to assignments provided by City & Guilds and marked by the centre. This approach to assessment is more cost-effective than extensive workplace assessment, and it can be seen as adding to the national credibility of the awards.

Progression Awards will also help to clarify the links between different qualifications, particularly GNVQs and N/SVQs. In this way, the strengths of various approaches to learning and development can be enhanced.

Progression Awards will enable candidates to acquire knowledge and understanding which will help them in the world of work. They will provide specific evidence of underpinning knowledge to facilitate the subsequent achievement of an N/SVQ, although the new awards will not themselves imply occupational competence.

General structure

Progression Awards are made up of units, sometimes there are choices – for example, five mandatory units and one chosen from a group of optional units. Sometimes there are different specialisms – for example three units for cabinet making (to get an award in Handcrafted Furniture) or three units for veneering, etc.

As far as possible, the units have been expressed in a standard format which fits in with the principles underlying N/SVQ units.

For each Progression Award, a list of units is presented with a statement of the knowledge and understanding in identified units of the related N/SVQ which has been covered by each unit of the Progression Award (see section 2). Any choices required amongst units are also specified.

Each unit is preceded by a rationale which details
- the aims and general coverage of the unit
- how it relates to appropriate N/SVQ units (and sometimes also GNVQ, where feasible)
- the outcomes for the unit
- the structure of the unit, including practical activities (what the candidate must be able to do) and knowledge (what the candidate must know) for assessment purposes.

The content of each unit is expressed in outcomes, for each of which practical activities are listed followed by knowledge requirements.

Course design

In terms of delivering Progression Awards, the emphasis is expected to be on learning by doing. Although the awards do not imply occupational competence, candidates will be expected to carry out practical activities as a means of learning and to promote discussion and understanding.

Teachers/assessors are advised to familiarise themselves with the structure and content of a Progression Award before designing an appropriate course, but also to consider the requirements of the relevant N/SVQ, particularly with respect to knowledge and understanding.

As long as the requirements of the Progression Award are met, teachers/assessors can design courses of study in any way that they feel will best meet the needs of their candidates. Key skills (such as numeracy, communication skills, information technology, working with others, planning and organising own work) need to be covered throughout the teaching programme.

It is essential that candidates and teachers/assessors should be aware of health and safety considerations at all times. The need to ensure that candidates preserve the health and safety of others, as well as themselves, should be emphasised.

Candidates are likely to come from a variety of backgrounds, in that they will have had different education and training experiences, ambitions and opportunities. Teachers/assessors may therefore find it helpful to
- conduct an initial assessment of achievement for each candidate, so that prior learning can be credited and the entry level established
- consider what approaches to learning will best suit the candidates.

Teachers/assessors need to make these judgements by referring to the requirements of the Progression Award, and establish what candidates already know/can do to clarify where they need no further preparation before assessment.

During this initial assessment, teachers are likely to consider what, if any
- previous educational qualifications the candidates have, what training they have had and, in particular, what experience they have had in relevant GNVQ programmes/key skills
- previous practical experience the candidates have had which is relevant to the aims of the scheme, and from which relevant skills and knowledge may have been informally acquired.

When selecting appropriate approaches to learning and locations, teachers are likely to consider the results from initial assessments, as well as the availability and suitability of open or distance learning materials, or co-operative working with other centres.

Assessment

The assessment materials for Progression Awards are external written tests to assess knowledge and understanding, either for each unit or synoptically (that is, each test covers the content of more than one unit). For each unit, an assignment will be provided by City & Guilds to assess the attainment of practical outcomes, with guidance about how the centres are to mark candidates. At levels 1 and 2, the written paper will usually be multiple-choice. Some schemes may use short answer question papers, although these are most likely to be used for the higher level schemes.

External assessment has been included to ensure rigorous quality assurance. When written examinations are provided and marked by City & Guilds, every candidate attempts to answer the same questions and is marked in the same way against the same criteria. This ensures that national standards are maintained. When assignments are provided, they will be generic and adaptable, so as to meet the needs of different centres. Although there will be some variation, central guidelines are provided and external verification used to ensure the maintenance of national standards.

Quality assurance, including centre and scheme approval

Quality assurance includes initial centre approval, scheme approval, the centre's own procedures for monitoring quality and City & Guilds' ongoing monitoring by an external verifier. Details of City & Guilds' criteria and procedures can be found in *Providing City & Guilds' Qualifications – a guide to centre and scheme approval.*

Organisations not already approved to offer City & Guilds' qualifications will be required to apply for centre and scheme approval, normally simultaneously. There is a charge for initial centre approval, but not for a centre wishing to extend its approval portfolio.

Centres which already have centre approval need to obtain scheme approval for each individual City & Guilds' scheme they wish to offer. An application for scheme approval (Form SAP) will need to be completed for each scheme.

Copies of the relevant forms can be found in *Providing City & Guilds 'Qualifications – a guide to centre and scheme approval*, together with guidance on how these forms should be completed.

Centres wishing to offer Progression Awards will need to complete Form SAP for each Progression Award. If they are already approved to offer the related traditional vocational qualification or the related NVQ, desk-based approval procedures will be used, which do not require a centre visit.

External verifiers act on behalf of City & Guilds to ensure that assignments are delivered and graded in accordance with the guidance issued in the Assessors Guide. City and Guilds will audit centres and external verifiers to ensure that the quality of the Progression Award is maintained in line with QCA requirements.

Entry for assessment and certification

Candidates must enter for assessment and certification through a City & Guilds' approved centre. Procedures for registration and entry for all City & Guilds qualifications are detailed in the Product Catalogue on the City & Guilds website.

There is an appeals procedure which makes clear the circumstances under which appeals may be made, the information required and the procedures to resolve them. For further information on the appeals procedure, please consult the City & Guilds website under the following:

Uk/Centres and training providers/centre support/policy and procedures/appeals and complaints

Candidates for Progression Awards must be registered using Form S / Walled Garden. For dated examinations, candidates should be registered using Form S / Walled Garden by the first day of the preceding month at the latest. For assignments, centres use Form S / Walled Garden and tick Results Submission. Enter each component number claimed, followed by D, C, P or X, to indicate the grade achieved.

Centres will decide when each candidate should complete each assignment and mark them according to guidance from City & Guilds and External Verifiers. Results (in the form of grades) should be submitted as detailed above.

It is extremely important that all the details submitted are correct, otherwise the may be rejected during processing by City & Guilds.

Centres should always check carefully that
- centre name and number have been included accurately
- the correct award number and award name are included
- the correct component numbers have been used.

Candidates who enter for these awards will be internal candidates – that is, they enter through the centre(s) where they have prepared for the assessments, either by attendance at the centre, co-operation with another organisation, accreditation of prior learning and/or open learning methods. External candidates will not be accepted.

Centres will receive a consolidated *Results list* detailing the performance of all the candidates they enter, whether they are completely successful or not.

All candidates for City & Guilds certificates receive a *Notification of candidates results,* via the centre, giving details of their performance.

Candidates who successfully complete all the required assessments will receive a full certificate.

Certificates are issued through the centre at which candidates were entered. All candidates receive *Certificates of Unit Credit* which state the grade achieved in each assessment component (regardless of whether they have also gained a full certificate).

Section 2
Scheme Regulations : Electrical and Electronics Servicing – (Domestic Electrical Appliances)

Introduction

This award provides knowledge and understanding for the City & Guilds NVQ in Electrical and Electronics Servicing (2248) – Domestic Electrical Appliances. It will be of particular value to those who cannot yet complete an NVQ, while providing a worthwhile qualification whether or not the candidate progresses to an NVQ.

Certificates and assessments

The certificates described in this document are for the **Progression Award: Electrical and Electronics Servicing**. It is a qualification at level 2 of the framework for NVQ and other vocational qualifications.

City & Guilds does not itself provide courses of instruction or specify entry requirements. Approved centres arrange assessments and may recommend that preparations for assessments do not need to be undertaken for parts of the scheme where candidates are already adequately prepared.

Assignments

Copies of assignments materials are available on request from City & Guilds. Please contact the Building Services team on 0207 294 2731/2674 to obtain copies.

The assignment materials contain the following:
- candidate's assignments logbook
- assessor's assignment guide book.

Centres use the same assignment materials each year. Therefore if centres already have copies of the assignments, these may be re-used for each consecutive set of candidates.

With regard to assignment verification, External Verifiers normally visit centres annually for quality checking and auditing. A sample representation of assignments may need to be viewed during this time.

Multiple choice papers

These are provided for examinations on fixed dates, in June and December each year. Details of examination dates and times are given in the Product Catalogue on the City & Guilds website. Multiple choice examinations are marked by City & Guilds.

Grades

Each of the assessment components will be graded (Pass, Credit or Distinction). A pass is the achievement level required for the knowledge and understanding in the NVQ, and generally represents the ability to follow instructions. Credit and Distinction represent increasing levels of ability to adapt in the face of changing circumstances and independently resolve problems.

Provision and conduct of assessments

Details of the availability of assessments, dates for examinations and of the general regulations for their conduct are given in the Product Catalogue on the City & Guilds website.

Progression Award: Electrical and Electronics Servicing – Domestic Electrical Appliances

Core units	Assessments
Unit 1 – d.c. principles, components and applications	**Assignment** 6958-02-014 d.c Principles, components and applications. This component will cover the practical outcomes for Unit 1.
Unit 2 – a.c. mains power and applications	**Assignment** 6958-02-015 a.c. Mains power and applications. This component will cover the practical outcomes for Unit 2.
Unit 3 – a.c. motors for domestic applications	**Assignment** 6958-02-016 a.c. Motors for domestics applications. This component will cover the practical outcomes for Unit 3.
Unit 4 – Controllers and components	**Assignment** 6958-02-017 Controllers and components. This component will cover the practical outcomes for Unit 4.
Unit 5 – Mechanical services and components	**Assignment** 6958-02-018 Mechanical services and components. This component will cover the practical outcomes for Unit 5.
Optional units	
Unit 6 – Home laundry appliances and domestic washers	**Assignment** 6958-02-019 Home laundry appliances and domestic washers. This component will cover the practical outcomes for Unit 6.
Unit 7 – Cooking appliances (including microwave cookers)	**Assignment** 6958-02-020 Cooking appliances (including microwave cookers). This component will cover the practical outcomes for Unit 7.
Unit 8 – Refrigeration systems and portable air conditioning	**Assignment** 6958-02-021 Refrigeration systems and portable air conditioning This component will cover the practical outcomes for Unit 8.
	Written (multiple-choice) 6958-02-022 Domestic electrical appliances core studies: first written – (multiple choice) 2 hours This component will cover the knowledge requirements for Units 1, 2 and 3.
	Written (multiple-choice) 6958-02-023 Domestic electrical appliances core studies: second written – (multiple choice) 1 hour 30 minutes This component will cover the knowledge requirements for Units 4 and 5.
	Written (multiple-choice) 6958-02-024 Home laundry appliances and domestic washers – Written (multiple-choice) 1 hour. This component will cover the knowledge requirements for Unit 6.
	Written (multiple-choice) 6958-02-025 Cooking appliances (including microwave cookers) – Written (multiple-choice) 1 hour. This component will cover the knowledge requirements for Unit 7.
	Written (multiple-choice) 6958-02-026 Refrigeration systems and air conditioning systems – Written (multiple choice) 1 hour. This component will cover the knowledge requirements for Unit 8.

Relationship to NVQ

Progression Award: Electrical and Electronics Servicing Level 2 – Domestic Electrical Appliances

Core units

1 d.c. principles, components and applications
2 a.c. mains power and applications
3 a.c. motors for domestic applications
4 Controllers and components
5 Mechanical services and components

Options

6 Home laundry appliances and domestic washers
7 Cooking appliances (including microwave cookers)
8 Refrigeration systems and portable air conditioning systems

Unit Core units	**Unit of NVQ (2248) for which knowledge and understanding is covered**
1	18.1, 18.2, 18.3
2	18.1, 18.2, 18.3
3	9.1, 18.1, 18.2, 18.3
4	9.1, 18.1, 18.2, 18.3
5	9.1, 9.2, 18.1, 18.2, 18.3
Optional units	
6	4.1, 4.2, 4.3, 4.4, 4.5, 5.1, 5.2, 5.3, 6.1, 6.2, 7.1, 7.2, 9.1, 9.2, 11.1, 11.4, 18.1, 18.2, 18.3
7	4.1, 4.2, 4.3, 4.4, 4.5, 5.1, 5.2, 5.3, 6.1, 6.2, 7.1, 9.1, 9.2, 11.1, 11.4, 18.1, 18.2, 18.3
8	4.1,4.3, 4.4, 4.5, 5.1, 5.2, 5.3, 6.1, 6.2, 7.1, 7.2, 9.1, 9.2, 11.1, 11.4, 18.1, 18.2, 18.3

Test specifications

Core units

The knowledge requirements will be assessed by one multiple choice test covering units 1 to 3 and one multiple choice test covering units 4 and 5.

Paper 1 Domestic Electrical Appliances Core Studies: First Written

Test duration: 2 hours
Total items: 70

Unit	Outcome	No of items
1	1 Electrical units, circuits and cables	
	1.1 electrical units and properties of electrical circuits	4
	1.2 fundamental electrical formulae and calculations	3
	1.3 the properties of conductors and insulators	3
	2 Effects of heat in devices	
	2.1 the effects of heat in materials and devices	4
	2.2 circuit protection and indicator devices	3
	3 Resistive devices, circuits and safety at work	
	3.1 resistive devices and circuits	5
	3.2 the need for health and safety at work	3
2	1 a.c. mains power	
	1.1 fundamentals of alternating current and voltage	4
	1.2 working principles of the a.c. mains supply	4
	1.3 economic aspects of energy consumption	2
	2 Electromagnetic devices and capacitors	
	2.1 the behaviour of magnets and electromagnets	6
	2.2 the property of capacitance	S
	3 Electrical safety	
	3.1 electrical safety for workshop and field service	3
	3.2 hazards and first aid treatment for workshop and field service	1
3	1 Motors used in domestic appliances	
	1.1 the universal motor	4
	1.2 versions of the single phase induction motor	5
	1.3 small a.c. motors	2
	2 Bearings and belt drive systems	
	2.1 bearings used in motors	2
	2.2 belt drive systems used in domestic appliances	3
	2.3 pulleys used in domestic appliances	2
	2.4 employees' responsibilities for workshop safety	2

Paper 2 – Domestic Electrical Appliances Core Studies: Second Written

Test duration: 1 hour 30 minutes
Total items: 50

Unit	Outcome	No of items
4	1 Switches used in domestic white goods	
	1.1 passive components for switching	6
	2 Solid state devices	4
	3 Control systems and controllers	
	3.1 basic control systems	6
	3.2 sequential controllers	6
	3.3 health and safety aspects of assembly processes	2
	3.4 principles and limitations of first aid	2
5	1 Rotating masses and bearings	
	1.1 bearings for rotating shafts in appliances	3
	1.2 rotating drums used in appliances	5
	1.3 personal preventative measures to be taken in the workplace	2
	2 Air movement and condensation	
	2.1 methods of air movement and venting	3
	2.2 aspects of condensation in appliances	2
	2.3 personal behaviour leading to workplace accidents	2
	3 Domestic water supply and waste services	
	3.1 aspects of domestic water supplies	3
	3.2 solenoid operated valves for domestic appliances	2
	3.3 methods of connection to domestic waste water services	2

Optional units

The knowledge requirements will be assessed by one multiple choice test for **each** of the optional units 6, 7 and 8.

Paper 3 – Home Laundry Appliances and Domestic Washers

Test duration: 1 hour
Total items: 40

Unit	Outcome	No of items
6	1 Automatic washing machines and the wash function of automatic washer/dryers	
	1.1 factors to be considered on installation	2
	1.2 safety aspects of automatic washing machines	2
	1.3 machine specification from manufacturers' data	3
	1.5 the importance of preventive maintenance	3
	1.6 factors associated with the wash function	3
	1.8 procedures and practices for moving and storing loads in workshop and field service	2
	2 Tumble dryers and the dryer function of automatic washer/dryers	
	2.1 installation of dryers	3
	2.2 safety aspects of dryers	2
	2.3 machine specification from manufacturers' data	2
	2.5 the importance of preventive maintenance	4
	2.6 the drying function	2
	3 Dishwashers	
	3.1 installation of automatic dishwashers	2
	3.2 safety aspects of dishwashers	1
	3.3 machine specification from manufacturers' data	2
	3.5 preventive maintenance	2
	3.6 the wash and dry function	3
	3.8 employees' responsibilities towards the maintenance of field service safety	2

Paper 4 – Cooking Appliances (Including Microwave Cookers)

Test duration: 1 hour
Total items: 40

Unit	Outcome	No of items
7	1 Electrically powered hobs	
	1.1 installation of an electric hob	2
	1.2 safety aspects of electrically powered hobs	2
	1.3 appliance specification from manufacturers' data	1
	1.4 hob element construction and operation	5
	1.6 preventive maintenance	1
	1.8 procedures and practices for moving and storing loads in workshop and field service	2
	2 Electric (conventional) ovens and fan ovens	
	2.1 installation of electric (conventional) ovens and fan ovens	2
	2.2 safety aspects of electric (conventional) ovens and fan ovens	2
	2.3 appliance specification from manufacturers' data	2
	2.4 combined hob and oven	2
	2.6 preventive maintenance	
	3 Microwave ovens	
	3.1 installation of a microwave oven	2
	3.2 operating principles of microwave ovens	5
	3.3 propagation of microwaves	4
	3.4 safety aspects of a microwave oven	2
	3.5 appliance specification from manufacturers' data	1
	3.7 preventive maintenance	1
	3.9 employees responsibilities towards the maintenance of field service safety	2

Paper 5 – Refrigeration Systems and Portable Air Conditioning Systems

Test duration: 1 hour
Total items: 40

Unit	Outcome	No of items
8	1 Refrigerators, freezers and fridge freezers	
	1.1 refrigeration principles	4
	1.2 practical refrigeration systems	8
	1.3 installation of refrigerators, freezers and fridge freezers	2
	1.4 safety aspect of refrigerators, freezers and fridge freezers	3
	1.5 appliance specification from manufacturers' data	2
	1.7 preventive maintenance	2
	1.9 the absorption type refrigeration cycle	2
	2 Portable air conditioning systems	
	2.1 the principles of air conditioning	2
	2.2 practical air conditioning systems	4
	2.3 installation of portable air conditioning systems	2
	2.4 safety aspects of portable air conditioning systems	1
	2.5 appliance specification from manufacturers' data	2
	2.7 preventive maintenance	2
	2.9 field service safety	2
	2.10 moving and storing loads in workshop and field service	2

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Unit 1
d.c. principles, components and applications

Rationale

This unit concerns the introduction to d.c. circuits, conductors, insulators, fundamental passive components and testing techniques.

There are three performance outcomes for this unit. The candidate can
1 demonstrate an understanding of electrical units, circuits and cables and apply this knowledge in a practical situation
2 demonstrate an understanding of the effects of heat in devices and apply this knowledge in a practical situation
3 demonstrate an understanding of resistive devices and safety at work and apply this knowledge in a practical situation.

Connections with other awards

This unit is designed to provide the underpinning knowledge for Unit 18 of the NVQ in Electrical and Electronics Servicing Level 2: *Verify tools and equipment for the Service activity.*

Assessment

The outcome for this unit will be assessed on evidence resulting from

1 Practical activities
These are listed for each outcome in the next section. The assessment takes the form of set assignments. In addition to practical activity the candidate may be required to answer oral questions in order to fulfil the learning requirements of the scheme. The time required for candidates to demonstrate the requisite skills will vary according to their abilities, motivation and prior experience.

2 Written tests
The underpinning knowledge requirements of this unit are listed for each outcome below. These will be assessed by a multiple choice question paper, based on a test specification included in the scheme.

Unit 1
d.c. principles, components and applications

Outcome 1
Demonstrate an understanding of electrical units, circuits and cables and apply this knowledge safely in practical situations

Practical activities

1 Carrying out practical calculations involving electrical formulae and units.
2 Using a multimeter to measure voltage and resistance.
3 Assembling electrical connectors.
4 Carrying out continuity and insulation tests on connectors and cables.

Underpinning knowledge

The candidate knows
1 electrical units and properties of electrical circuits and can
  a recognise the path of current in a circuit
    i conventional current for the majority of circuits
    ii electron flow for some solid state devices and the CRT
  b interpret a circuit diagram with relevant BS symbols consisting of
    i supply
    ii fuse
    iii switch
    iv conductor
    v load
  c describe switch contact arrangements
    i SPST
    ii SPDT (SPCO)
    iii DPST
    iv DPDT (DPCO)
  d state the effects of an electric current and give examples
    i heating effect
    ii magnetic effect
    iii chemical effect
  e define electrical units
    i volt
    ii ampere
    iii ohm
    iv joule
    v watt

2 fundamental electrical formulae and calculations and can
- a explain powers of ten and express symbols for units in standard form for multiples and submultiples
- b explain the use of SI prefixes with electrical units
  - i mega-
  - ii kilo-
  - iii milli-
  - iv micro-
  - v nano-
- c state the symbols for quantities and the relationship between them
  - i V=IR
  - ii P=IV etc
  - iii W=Pt (applied to kW x hours only)
- d explain decimal places, significant figures, squares, square roots reciprocals, ratios and average
- e undertake practical calculations involving addition, subtraction, multiplication and division of decimal numbers
- f perform transpositions and calculations based on the formulae in c)

3 the properties of conductors and insulators and can
- a give examples of each
- b describe the factors which affect resistance
  - i length (quantitatively)
  - ii cross sectional area (quantitatively)
  - iii resistivity (qualitatively)
- c explain the importance of copper for cable conductors and printed circuit board tracks
- d perform calculations based on the relationships in b) i) and ii)
- e describe flexible mains cables for equipment
  - i rating
  - ii cross sectional area
  - iii colour codes for flexible cables brown, blue, green/yellow and red, black, green for older cables
- f describe colour code used for fixed wiring
- g recognise current ratings of mains plugs
  - i BS1363 13A type
  - ii IEC 6/10A types
- h describe preventive maintenance for flexible mains cables
- i describe procedures for practical measurements and assembly
  - i selection and care of instruments for circuit testing
  - ii use of multimeter voltage and resistance ranges
  - iii identification and care of tools for assembly tasks
  - iv screw and solder terminations
  - v wiring a mains plug and socket

Outcome 2
Demonstrate an understanding of the effects of heat in devices and apply this knowledge safely in a practical situation

Practical activities

1 Carrying out thermostat and thermal overload cutout test procedures.
2 Undertaking continuity tests on fuses and lamps.

Underpinning knowledge

The candidate knows
1 the effects of heat in materials and devices and can
  a describe the effects of temperature change and give examples for
    i solids
    ii liquids
    iii gases
  b explain methods of heat transfer
    i conduction
    ii convection
    iii radiation
  c describe materials for thermal insulation in domestic equipment
  d describe thermostat operation and applications
    i bimetal fixed and multiple position
    ii contact arrangements (NO, NC)
    iii variable (capillary) thermostats
    iv thermal overload cutouts (TOC), self and manual reset

2 circuit protection and indicator devices and can
  a define fuse rating and recognise common fuses
    i anti-surge types
    ii quick blow fuse
    iii thermal fuse
  b recognise mains fuses and applications
    i fused plug
    ii IEC fused socket
    iii colour coding for mains fuses
    iv procedure for fuse replacement
  c recognise panel lamps, applications and symbols
    i neon indicator
    ii MES
    iii MCC
    iv MBC
    v typical operating voltages and currents
    vi circuit symbols for panel lamps
  d describe procedures for practical measurements
    i selection and care of instruments for circuit testing
    ii continuity tests on fuses and lamps
    iii thermostat and TOC test procedures
    iv health and safety aspects of the foregoing tasks

Unit 1
d.c. principles, components and applications

Outcome 3
Demonstrate an understanding of resistive devices, circuits and safety at work and apply this knowledge safely in a practical situation

Practical activities

1 Making resistance tests on heating elements, wire wound resistors and thermistors.

Underpinning knowledge

The candidate knows
1 resistive devices and circuits and can
  a describe the effect of heat on resistance of metallic elementary conductors and common insulating materials
  b explain power dissipation in components
  c describe heating elements
    i exposed
    ii covered
  d describe wire wound resistor construction
    i insulated
    ii non-insulated
  e state thermistor properties
    i PTC
    ii NTC
  f solve resistive circuit calculations limited to two resistors in series and two resistors in parallel (using product over sum method)
    i perform transpositions based on the formulae
    ii total resistance
    iii voltages
    iv currents
    v power
  g describe procedures for practical measurements
    i selection and care of instruments for circuit testing
    ii resistance tests on heating elements, wire wound resistors and thermistors
    iii health and safety aspects of the foregoing tasks

2 the need for health and safety at work and can
  a refer to the legal background
    i HASAWA 1974
    ii Electricity at Work Regulations 1989
    iii Safety Reps. and Committees 1977
    iv Notification of Accidents etc 1980
    v Manual Handling Operations Regulations 1992
    vi Noise at Work Act 1989
    vii Reporting of Injuries (RIDDOR) 1995
    viii Management of Health and Safety Regulations 1992 (Regulation 12 Employee's Responsibility)
    ix Personal Protective Equipment Regulations 1992 (Regulation 10 Employee's Responsibility)

b describe personal attitudes to safety in the workshop and field service
   i the need to act safely and responsibly
   ii the need to work safely and responsibly
   iii the need for awareness of the safety of others
c describe fire prevention and equipment
   i conditions required for combustion
   ii causes and spread of fire
   iii fire prevention
   iv fire fighting equipment for different types of fire
   v fire drill
d describe evacuation procedures
   i alarms and signals
   ii signs
   iii exits
   iv emergency evacuation procedures for fire, explosion, toxic atmosphere, terrorist activity
   v evacuation drill

Unit 2
Mains power and application

Rationale

This unit concerns the introduction to a.c. circuits, reactive components, assembly and testing techniques.

There are three performance outcomes for this unit. The candidate can
1 demonstrate an understanding of a.c. mains power and apply this knowledge in a practical situation
2 demonstrate an understanding of electromagnetic devices and capacitors and apply this knowledge in a practical situation
3 demonstrate an understanding of electrical safety and apply this knowledge in a practical situation.

Connections with other awards

This unit is designed to provide the underpinning knowledge for Unit 18 of the NVQ in Electrical and Electronics Servicing Level 2: *Verify tools and equipment for the service activity.*

Assessment

The outcomes for this unit will be assessed on evidence resulting from

1 Practical activities
These are listed for each outcome in the next section. The assessment takes the form of a set assignment. In addition to practical activity the candidate may be required to answer oral questions in order to fulfil the learning requirements of the scheme. The time required for candidates to demonstrate the requisite skills will vary according to their abilities, motivation and prior experience.

2 Written test
The underpinning knowledge requirements are listed for each outcome below. These will be assessed by a multiple-choice question paper based on the test specifications outlined in the scheme.

Unit 2
Mains power and application

Outcome 1
Demonstrate an understanding of a.c. mains power and apply this knowledge safely in a practical situation

Practical activities

1 Carrying out practical calculations based on 230V a.c. mains.
2 Using instruments to test for the presence of mains voltage.
3 Resetting MCB and RCD devices.
4 Testing and renewing mains fuses.
5 Reading an energy meter.

Underpinning knowledge

The candidate knows
1 fundamentals of alternating current and voltage and can
  a define for a sinusoidal waveform
    i cycle
    ii periodic time
    iii frequency
    iv peak value
    v peak-to-peak value
    vi root mean square value
  b state typical frequencies for
    i power distribution
    ii audible warning devices
    iii microwave cooking
  c describe the use of graphs
    i axes
    ii scales
  d use waveforms of voltage or current to define
    i in phase
    ii antiphase
    iii 90 deg phase shift
  e solve power calculations for resistance only a.c. circuits using rms values based on 230V supply
    i heater elements
    ii incandescent lamps
    iii power for 13A and 30A full rating

2 working principles of the a.c. mains supply and can
  a identify on a diagram
    i connection from local substation for single phase supply
    ii consumer's circuit, main fuse, energy meter, consumer unit,
    iii lighting and ring main circuits
    iv cooker and water heater circuits
    v spurs
  b explain why equipment is earthed
  c give reasons for earth bonding in kitchens and bathrooms

d state the purpose of mains fuses in a consumer unit
  i fuse ratings
  ii coding
  iii renewal procedure
e state MCB principle of operation and application in a consumer unit
  i MCB ratings
  ii reset procedure
f state the purpose of cartridge fuses in fused plugs
  i fuse ratings
  ii coding
g state RCD principle of operation and application in a consumer unit
  i tripping current
  ii rated contact current
  iii reasons for tripping caused by appliances
  iii reset procedure
h state the purpose of double insulation in equipment
  i applications
  ii flexible wiring arrangement
i describe procedures for practical measurements and repair
  i health and safety aspects of reset and repair processes
  ii identification and care of tools needed for repair tasks
  iii selection and care of instruments for circuit testing
  iv mains testing using a multimeter and neon tester
  v fuse continuity test
  vi rewiring a fuse
  vii replacing a cartridge fuse

3 economic aspects of energy consumption and can
  a define the kWh unit
  b describe the procedure to read an energy meter
  c describe typical domestic tariffs
  d determine domestic appliance loadings from rating plate information
  e describe cheap rate periods and methods of time switching

Unit 2
Mains power and application

Outcome 2
Demonstrate an understanding of electromagnetic devices and capacitors and apply this knowledge safely in a practical situation

Practical activities

1 Carrying out practical tests on electromagnetic devices.
2 Testing capacitors.

Underpinning knowledge

The candidate knows
1 the behaviour of magnets and electromagnets and can
  a define magnetic poles
  b draw field patterns for simple permanent magnets and electromagnets
  c describe the effect of magnetic and non magnetic materials near a permanent magnet
  d describe the effect of a magnetic material in the core of an electromagnet with applications
    i solenoid
    ii relay magnetic circuit
    iii magnetic buzzer
  e describe power relay operation and applications
    i operation on AC and DC supplies
    ii contact arrangements (NO, NC, SP, DP)
    iii circuit symbols
  f describe the force on a current-carrying conductor in a magnetic field with applications
    i d.c. permanent magnet motor
    ii moving coil meter
  g describe electromagnetic induction with applications
    i simple generator
    ii inductor
    iii step down transformer
    iv step up transformer
    v isolating transformer
    vi constructional features of coils and transformers
    vii inductor and transformer circuit symbols
  h describe inductor function in a circuit
    i restricts high frequency a.c.
    ii path for d.c. and low frequency a.c.
    iii suppression choke example

2 the property of capacitance and can
  a define
    i capacitance as the ability to store charge
    ii unit of capacitance
  b state the elements of a capacitor and their effect on capacitance
    i plate area
    ii dielectric thickness (quantitatively)
    iii nature of dielectric (qualitatively)
    iv circuit symbols for capacitors
  c recognise wound capacitors and applications
    i metallised polymer (motor start/run)
    ii non-polarised aluminium electrolytic (motor start)
    iii polarised electrolytic (power supply smoothing)
  d explain practical aspects of capacitor applications
    i importance of voltage rating
    ii capacitor terminals and leads
    iii connection of polarised electrolytics
  e describe capacitor function in a circuit
    i block to d.c.
    ii path for a.c.
  f describe procedures for practical measurements
    i selection and care of instruments for circuit testing
    ii insulation, continuity and resistance measurements on d.c. PM motors, solenoids, magnetic buzzers, relays, suppression coils and transformers
    iii measurement of transformer primary and secondary voltages
    iv insulation resistance measurements on starter capacitors and start/run capacitors

Unit 2
Mains power and application

Outcome 3
Demonstrate an understanding of electrical safety and apply this knowledge safely in a practical situation

Practical activities

1 Carrying out circuit isolation, verification and securing.
2 Inspecting and checking cables, leads and plugs for safety.
3 Carrying out electrical safety measurements.

Underpinning knowledge

The candidate knows
1 electrical safety for workshop and field service and can
  a give reasons for compliance with BS 7671 Code of practice (IEE Wiring Regulations, current edition)
  b explain the danger of electric shock from the use of electrical equipment
  c state how risks may be reduced by observing codes of practice, standards and legislation
  d state the need to avoid working on live equipment
  e list measures to ensure safety
    i circuit isolation
    ii verification and securing
    iii circuit identification by notices and labelling
  f describe how to inspect and check cables, leads and plugs for safety
  g describe portable equipment hazards
  h describe procedures for portable appliance testing (PAT testing) (Electricity at Work Regulations 1989)

2 hazards and first aid treatment for workshop and field service and can
  a describe the human body as part of an electrical circuit
  b state how to isolate a casualty from a live circuit
  c explain methods of resuscitation
  d describe burn injuries from high energy electrical faults
  e describe appropriate first aid treatment for burn injuries

3 electrical safety measurements and can
  a describe procedures for practical measurements
    i identification and care of instruments for servicing tasks
    ii measurement of earth fault loop impedance
    iii measurement of circuit protective conductor resistance
    iv measurement of appliance insulation resistance
  b identify sources of high resistance in the earth fault loop.

Unit 3
a.c. motors for domestic applications

Rationale

This unit concerns the range of a.c. motors used in domestic appliances, their applications and associated belt drives.

There are two performance outcomes for this unit. The candidate can
1 demonstrate an understanding of motors used in domestic appliances and apply this knowledge safely in a practical situation
2 demonstrate an understanding of bearings and belt drive systems and apply this knowledge in a practical situation while observing safe practices.

Connections with other awards

This unit is designed to provide the underpinning knowledge and understanding necessary for Units 9 and 18 of the NVQ in Electrical and Electronics Servicing Level 2: *Rectify faults through the replacement of modules* and *Verify tools and equipment for the service activity.*

Assessment

The outcomes for this unit will be assessed on evidence resulting from

1 Practical activities
These are listed for each outcome in the next section. The assessment takes the form of a set assignment. In addition to practical activity the candidate may be required to answer oral questions in order to fulfil the learning requirements of the scheme. The time required for candidates to demonstrate the requisite skills will vary according to their abilities, motivation and prior experience.

2 Written test
The underpinning knowledge requirements are listed for each outcome below. These will be assessed by a multiple-choice question paper based on the test specifications outlined in the scheme.

Unit 3
a.c. motors for domestic applications

Outcome 1
Demonstrate an understanding of motors for domestic applications and apply this knowledge safely in a practical situation

Practical activities

1 Identifying different types of a.c. motor used in appliances.
2 Carrying out practical tests on a.c. motors.

Underpinning knowledge

The candidate knows
1 the universal motor and can
  a state the power rating of a motor in watts and horsepower
  b define motor torque
  c describe the construction and operation of the universal (brush) motor
    i field and armature arrangements
    ii electrical connections
    iii circuit symbol
    iv speed range
    v direction of rotation
    vi motor protection
    vii applications
  d give examples of radio interference suppression devices
    i principle of operation
    ii electrical connections
    iii circuit symbols

2 versions of the single phase induction motor and can
  a describe basic construction and motor specification
    i electrical connections
    ii speed
    iii direction of rotation
    iv protection
    v mounting methods
  b describe start and run behaviour for the different versions
    i capacitor start and run
    ii relay start
    iii capacitor start with centrifugal switch
  c identify aspects of motor start/run and start capacitors
    i capacitor type
    ii mounting methods
    iii capacitance value
    iv voltage rating
    v charge storage hazard
  d give examples of single phase induction motor applications

3 small a.c. motors and can
- a describe practical aspects of the shaded pole induction motor
  - i construction
  - ii electrical connections
  - iii speed
  - iv direction of rotation
  - v protection
  - vi applications
- b describe practical aspects of the permanent magnet rotor single phase motor
  - i construction
  - ii electrical connections
  - iii speed
  - iv direction of rotation
  - v protection
  - vi application as a pump motor

4 testing methods for motors and can
- a describe procedures for practical measurements
  - i selection and care of instruments for testing
  - ii safety aspects of motor and capacitor testing
- b describe procedures for insulation, continuity and resistance measurements on a.c. motors including starting and suppression components
  - i universal motor
  - ii single phase induction motor
  - iii shaded pole induction motor
  - iv permanent magnet rotor single phase motor
- c identify common faults in a.c. motors

Unit 3
a.c. motors for domestic applications

Outcome 2
Demonstrate an understanding of bearings and belt drive systems and apply this knowledge safely in a practical situation

Practical activities

1 Determining the condition of bearings.
2 Replacing drive belts.
3 Setting up belt tension.

Underpinning knowledge

The candidate knows
1 bearings used in motors and can
  a give examples of common types
    i sleeve bearing
    ii ball race bearing
  b state how to determine the condition of bearings
  c describe common bearing faults

2 belt drive systems used in domestic appliances and can
  a give examples of drive belts with applications
    i V-belt
    ii multi-V belt
    iii round elasticated belt
    iv flat elasticated belt
  b describe the need for tension in belts
    i belt tensioners
    ii procedure for setting up belt tension
  c describe belt replacement procedure
  d identify common faults in belt drive systems

3 pulleys used in domestic appliances and can
  a describe the construction of plain pulleys
    i materials used
    ii method of attachment to motor shaft
    iii speed ratio in terms of pulley diameters
  b describe the construction and application of centrifugal or variomatic pulleys
    i operating principle
    ii speed ratios
  c give examples of common faults in pulley systems

4 employees' responsibilities for workshop safety and can
  a explain how to take care of own health and that of others
  b state the need to respect equipment provided for health and safety
  c describe procedures to ensure safety of repair on completion
  d state reporting requirements
    i report all hazards and notify authorities
    ii report accidents to employer
    HASAWA 1974 Reporting of Injuries (RIDDOR) 1995
    Notification of Accidents etc 1980
    Management of Health and Safety Regulations 1992
    (Regulation 12 Employees Responsibility)

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Unit 4
Controllers and components

Rationale

This unit concerns methods for controlling electrical power in appliances using switches, solid state devices and sequential controllers.

There are three performance outcomes for this unit. The candidate can
1 demonstrate an understanding of switches used in domestic appliances and apply this knowledge in a practical situation
2 demonstrate an understanding of solid state devices and apply this knowledge in a practical situation
3 demonstrate an understanding of control systems and controllers and apply this knowledge in a practical situation while observing safe practices.

Connections with other awards
This unit is designed to provide the underpinning knowledge for Units 9 and 18 of the NVQ in Electrical and Electronics Servicing Level 2: *Rectify faults through the replacement of modules* and *Verify tools and equipment for the service activity.*

Assessment

The outcomes for this unit will be assessed on evidence resulting from

1 Practical activities
These are listed for each outcome in the next section. The assessment takes the form of a set assignment. In addition to practical activity the candidate may be required to answer oral questions in order to fulfil the learning requirements of the scheme. The time required for candidates to demonstrate the requisite skills will vary according to their abilities, motivation and prior experience.

2 Written test
The underpinning knowledge requirements are listed for each outcome below. These will be assessed by a multiple-choice question paper based on the test specifications outlined in the scheme.

Unit 4
Controllers and components

Outcome 1
Demonstrate an understanding of switches used in domestic electrical appliances and apply this knowledge safely in a practical situation

Practical activities

1 Carrying out tests on manually operated switches.
2 Carrying out tests on micro, pressure, float and tilt switches.

Underpinning knowledge

The candidate knows
1 passive components for switching and can
  a describe manually operated switches
    i rotary
    ii toggle
    iii rocker
    iv slide switch
    v push button switches, latching and non latching
  b describe microswitches
    i plunger
    ii roller
    iii lever
  c describe pressure switches
    i single level
    ii multiple level
  d describe float and tilt switches
  e explain the need to minimise arcing, erosion, welding and corrosion of switch contacts
  f describe procedures for practical measurements
    i identification and care of instruments for servicing tasks
    ii continuity testing of switches listed above

Outcome 2
Demonstrate an understanding of solid state devices and apply this knowledge safely in a practical situation

Practical activities

1 Testing solid state devices.

Underpinning knowledge

The candidate knows
1 solid state devices and can
- a describe the diode as a one way device, based on silicon
- b identify anode and cathode associated with P and N regions
- c recognise power diodes
  - i symbols
  - ii coding
- d describe half wave rectifier operation with AC input
- e recognise display devices
  - i single LED
  - ii 7-segment LED display
- f describe procedures for practical measurements
  - i identification and care of instruments for servicing tasks
  - ii diode testing with a multimeter

Unit 4
Controllers and components

Outcome 3
Demonstrate an understanding of control systems and controllers and apply this knowledge safely in a practical situation

Practical activities

1 Testing a tacho generator.
2 Carrying out tests on timers.
3 Measuring controller supply voltage.
4 Making continuity tests on wiring.

Underpinning knowledge

The candidate knows
1 basic control systems and can
  a define open loop and closed loop control systems
  b state function of a sensor
  c give examples of water heating using
    i thermostat
    ii temperature controller module with a thermistor sensor
  d describe motor speed control using speed controller module and tacho generator for
    i universal (brush) motor
    ii induction motor
  e describe tacho generator construction and electrical connections
  f describe procedures for practical measurements
    i identification and care of instruments for servicing tasks
    ii tacho generator testing

2 sequential controllers and can
  a describe the mechanical (run back) timer
  b identify features of a motor driven programmer/timer
    i low power ac. synchronous motor with permanent magnet rotor
    ii thermo stop mechanism
    iii electrical stop
    iv dual motor timer
    v cam charts
    vi wiring diagram
  c recognise aspects of a micro processor-based controller module
    i function of the power board
    ii controller connections
  d give examples of wiring methods used in appliances
    i ribbon cable
    ii cable harness
    iii associated connectors
    iv wire coding and numbering
  e describe typical controller faults
  f describe the self diagnostic capability of microprocessor-controlled appliances

g describe procedures for practical measurements
  i identification and care of instruments for servicing tasks
  ii continuity test of mechanical (run back) timer contacts
  iii continuity test of motor driven programmer/timer contacts and motor coil
  iv measurement of microprocessor power board output voltage
  v continuity tests on wiring using coding and numbering for tracing
h explain module replacement procedures and handling precautions

3 health and safety aspects of assembly processes and can
  a use hand tools correctly and safely
  b use powered tools correctly and safely
  c use high temperature tools correctly and safely
  d dispose of waste material safely
    i sharp objects
    ii lamps
    iii electrolytic capacitors
    iv power transistors
    v discharged cells and batteries

4 the principles and limitations of first aid and can
  a state the aims of first aid
  b state the limits of first aid
  c know when to offer first aid
  d know when to seek further support
  e describe the basic first aid treatment for minor injuries

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Unit 5
Mechanical services and components

Rationale

This unit concerns aspects of rotation in appliances, air flow, water supply, and waste water services.

There will be 3 performance outcomes. The candidate will be able to:
1 demonstrate an understanding of rotating masses and bearings and apply this knowledge in a practical situation
2 demonstrate an understanding of air movement and condensation and apply this knowledge in a practical situation
3 demonstrate an understanding of domestic water supply and waste services and apply this knowledge in a practical situation while observing safe practices.

Connections with other awards

This unit is designed to provide the underpinning knowledge for Unit 9 and 18 of the NVQ in Electrical and Electronic Servicing Level 2: *Rectify faults through the replacement of modules* and *Verify tools and equipment for the service activity.*

Assessment

The outcomes for this unit will be assessed using evidence from:

1 Practical activities
These are listed for each outcome in the next section. The assessment takes the form of a set assignment. In addition to practical activity the candidate may be required to answer oral questions in order to fulfil the learning requirements of the scheme. The time required for candidates to demonstrate the requisite skills will vary according to their abilities, motivation and prior experience.

2 Written test
The underpinning knowledge requirements are listed for each outcome below. These will be assessed by a multiple-choice question paper based on the test specifications outlined in the scheme.

Unit 5
Mechanical services and components

Outcome 1
Demonstrate an understanding of rotating masses and bearings and apply this knowledge safely in a practical situation

Practical activities

1 Assessing bearing condition.
2 Extracting and replacing ball race and taper roller bearings.
3 Inspecting and adjusting brakes.
4 Observing safe working practices.

Underpinning knowledge

The candidate knows
1 bearings for rotating shafts in appliances and can
  a recognise bearing types
    i sleeve
    ii ball race
    iii taper roller
  b describe bearing seals and packings
  c state methods of lubrication in bearings
  d list common faults in bearings and seals
  e select, use and care for tools required for servicing appliances
  f describe procedures for bearing extraction and replacement

2 the behaviour of rotating drums used in appliances and can
  a describe the inertia of a body at rest and spinning
  b describe energy stored in a spinning mass
  c state typical spin and wash speeds
  d state tumble speed for a dryer
  e give examples of braking systems
  f describe the effects of vibration due to out of balance masses with examples
  g give reasons for out of balance condition in spin driers and automatic machines
  h describe the pre-spin or distribute cycle
  i describe drum mountings
    i drum suspension
    i damping
    iii function of tub weights
    iv function of transit fixings
    v common faults in drum mountings
  j select, use and care for tools required for servicing appliances
  k list fastenings used in appliances
  l describe brake adjustment procedures

3 personal preventative measures to be taken in the workplace and can
  a state the need for personal hygiene
    i skin care and protection
    ii ear and eye care
  b explain the hazards of moving machinery with regard to
    i hair
    ii loose clothing
    iii means of avoidance
  c state the requirements for and use of protective clothing
  d describe the use of protective equipment Personal Protective Equipment Regulations 1992 (Regulation 10 Employee's Responsibility)

Unit 5
Mechanical services and components

Outcome 2
Demonstrate an understanding of air movement and condensation and apply this knowledge in a practical situation

Practical activities

1 Removing and refitting a fan.
2 Removing and cleaning or replacing an air filter.

Underpinning knowledge

A candidate knows
1 methods of air movement and venting and can
  a outline constructional features of fans and blowers
    i axial fan
    ii tangential (centrifugal) fan
    iii fan housing
  b describe methods for venting exhaust air from appliances
    i temporary outlet
    ii permanent window vent
    iii permanent through-wall outlet
  c state the function of air filters and the importance of cleaning or replacement
  d select, use and care for tools required for servicing appliances
  e describe procedures for
    i fan removal
    ii refitting a fan
    iii cleaning air filters
    iv filter replacement

2 aspects of condensation in appliances and can
  a state how water vapour content of air depends upon temperature, with examples
  b describe how condensation occurs
  c describe condenser construction and operation

3 personal behaviour leading to workplace accidents and can
  a identify personal factors
    i carelessness
    ii unsuitable behaviour
    iii unsuitable dress
    iv fatigue
    v drug and alcohol abuse
  b identify shortcomings
    i lack of training
    ii lack of supervision
    iii lack of experience

Outcome 3
Demonstrate an understanding of domestic water supply and waste services and apply this knowledge in a practical situation

Practical activities

1 Fastening and releasing hose unions and clips.
2 Carrying out continuity testing of solenoid valves.
3 Assessing the condition of pumps.
4 Removing and refitting a pump.

Underpinning knowledge

1 aspects of domestic water supplies and can
  a state sources of hot and cold water
  b define water pressure requirements for domestic appliances
  c state Water Supply Byelaws relating to connections
  d describe the function of isolation taps and valves
  e identify supply hoses, hose unions and hose clips
  f describe water hardness and its effects of on domestic appliances
  g describe procedures for fastening and release of supply hose unions and clips

2 solenoid operated valves for domestic appliances and can
  a describe solenoid valve construction and operation
  b recognise double and triple versions of solenoid valve
  c list common faults in solenoid valves
  e select, use and care for instruments required for servicing appliances
  f test solenoid valves

3 methods of connection to domestic waste water services and can
  a describe anti-siphon methods
    i siphon breaks
    ii non-return valves
  b outline the construction and operation of discharge pumps
    i bearings
    ii seals
    iii impellers
    iv pump filters,
    v common faults in discharge systems
  c describe waste hoses, hose unions and hose clips
  d select, use and care for tools required for servicing appliances
  e describe procedures for removal and refitting a pump
  f describe procedures for fastening and release of waste hose unions and clips

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Unit 6
Home laundry appliances and domestic washers

Rationale

This unit concerns appliances which have a wash and dry function either for clothes or for crockery and cutlery.

There are three performance outcomes for this unit. The candidate can
1 demonstrate an understanding of automatic washing machines and the wash function of automatic washer/dryer and apply this knowledge in a practical situation
2 demonstrate an understanding of tumble dryers and the dryer function of automatic washer/dryers and apply this knowledge in a practical situation.
3 demonstrate an understanding of dishwashers and apply this knowledge in a practical situation.

Connections with other awards

This unit is designed to provide the underpinning knowledge for Unit 4, *Install products in customers' premises,* Unit 5, *Establish the status and condition of products,* Unit 6, *Rectify and prevent faults through preventive servicing procedures,* Unit 7, *Diagnose faults in products to module level,* Unit 9, *Rectify faults through the replacement of modules,* Unit 11, *Reinstate product for customer operation,* and Unit 18, *Verify tools and equipment for the service activity* of the NVQ in Electrical and Electronics Servicing Level 2.

Assessment

The outcomes for this unit will be assessed on evidence resulting from

1 Practical activities
These are listed for each outcome in the next section. The assessment takes the form of a set assignment. In addition to practical activity the candidate may be required to answer oral questions in order to fulfil the learning requirements of the scheme. The time required for candidates to demonstrate the requisite skills will vary according to their abilities, motivation and prior experience.

2 Written test
The underpinning knowledge requirements are listed for each outcome below. These will be assessed by a multiple-choice question paper based on the test specifications outlined in the scheme.

Unit 6
Home laundry appliances and domestic washers

Outcome 1
Demonstrate an understanding of automatic washing machines and the wash function of automatic washer/dryers and apply this knowledge safely in a practical situation

Practical activities

1 Installing an automatic washing machine and automatic washer/dryer.
2 Carrying out preventive maintenance on an automatic washing machine and automatic washer/dryer.
3 Carrying out faultfinding procedures.
4 Removing and replacing modules.

Underpinning knowledge

The candidate knows
1 factors to be considered on installation of automatic washing machines and automatic washer/dryers and can
   a describe procedures for unpacking
      i removal of transit packing
      ii removal of transit fittings
   b choose a position for the appliance
   c ensure the appliance is level
   d describe procedures for connection of services to the appliance
      i water supplies
      ii waste
      iii electrical supply
   e assess pressure or head of water supplies
   f assess water flow from fill time

2 safety aspects of automatic washing machines and automatic washer/dryers and can
   a show how provision is made for earthing
   b describe door lock operation
   c state how interlocking is achieved
   d state the legal requirement for door locking

3 how to use manufacturers' data to determine the machine specification and can
   a state power ratings
      i motors
      ii heaters
   b describe operating cycles and data
      i wash load
      ii volume of water used
      iii wash temperatures
      iv spin speed(s)
      v wash speed and direction

4 how to interpret schematic and layout diagrams and can
  a recognise modules and their location
  b describe procedures for module replacement
    i solenoid valves
    ii pump
    iii drive motor
    iv drive belts
    v timer
    vi door seals
    vii pressure switch
    viii drum

5 the importance of preventive maintenance and can
  a describe procedures for
    i water inlet filters
    ii drain filters
    iii door seals
    iv hoses
    v pumps
    vi sump hose catch pot
    vii drum suspension
    viii belt tension
    ix electrical plugs and connectors
    x lubrication
    xi descaling

6 factors associated with the wash function and can
  a identify relevant symbols of the International Textile Care labelling Code (ITCLC)
  b describe the function of detergents and additives
  c state precautions to be taken prior to loading
    i small items of clothing
    ii coins and small metal objects
  d assess the quality of wash and identify problems

7 procedures for faultfinding on an automatic washing machine or wash function of a washer/dryer and can
  a select, use and care for instruments required for servicing appliances
  b select, use and care for tools required for servicing appliances
  c carry out and record diagnostic procedures
  d locate a fault to module level
  e remove and replace faulty module by a serviceable spare
  f reassemble and test the appliance
  g observe safe working practices in the use of electricity and in handling appliances

8 procedures and practices for moving and storing loads in workshop and field service and can
  a define a load
  b describe hazards associated with moving loads
    i back injury
    ii injury to hands and feet
  c define the centre of gravity of a load
  d explain the use of gloves
  e describe the effect of load surface on grip
  f explain the need to avoid injury to other people when moving a load
  g describe how to minimise lifting
    i plan the move
    ii clear obstacles away
    iii use the most appropriate method
    iv adopt correct posture when lifting
  h describe techniques for stable stacking of goods
    Manual Handling Operations Regulations 1992

Unit 6
Home laundry appliances and domestic washers

Outcome 2
Demonstrate an understanding of tumble dryers and the dryer function of automatic washer/dryers and apply this knowledge safely in a practical situation

Practical activities

1 Installing vented and condensing types of tumble dryer.
2 Carrying out preventive maintenance on vented and condensing types of tumble dryer and the dryer function of automatic washer/dryers.
3 Carrying out faultfinding procedures.
4 Removing and replacing modules.

Underpinning knowledge

The candidate knows
1 factors to be considered on installation of vented and condensing types of tumble dryer and the dryer function of automatic washer/dryers and can
   a describe procedures for unpacking
      i removal of transit packing
      ii removal of transit fittings
   b choose a position for the appliance
   c ensure the appliance is level
   d assess pressure or head and flow rate of cold water supply
   e describe procedures for connection of services to the appliance
      i water supply
      ii waste
      iii electrical supply
      iv vent outlet

2 safety aspects of dryers and can
   a show how provision is made for earthing
   b describe door lock operation
   c state how interlocking is achieved

3 how to use manufacturers' data to determine the machine specification and can
   a state power ratings
      i motors
      ii heaters
   b describe operating cycles and data
      i drying load
      ii drying temperatures
      iii tumble speeds
      iv air flow path

4 how to interpret schematic and layout diagrams and can
  a recognise modules and their location
  b describe procedures for module replacement
    i heater
    ii motor(s)
    iii drive belts
    iv timer
    v thermostat
    vi solenoid valve (condensing type)
    vii pump (condensing type)
    viii door seals

5 the importance of preventive maintenance and can
  a describe procedures for
    i water inlet filter
    ii vent filter
    iii door seals
    iv hoses
    v pump
    vi pump filter
    vii motor mountings
    viii jockey pulleys and belts
    ix drum bearings
    x fluff removal
    xi electrical plugs and connectors

6 factors associated with the drying function and can
  a identify relevant symbols of the International Textile Care labelling Code (ITCLC)
  b state the need to avoid overloading
  c assess the drying quality and identify problems

7 procedures for faultfinding on a tumble dryer or dryer function of an automatic washer/dryer and can
  a select, use and care for instruments required for servicing appliances
  b select, use and care for tools required for servicing appliances
  c carry out and record diagnostic procedures
  d locate a fault to module level
  e remove and replace faulty module by a serviceable spare
  f reassemble and test the appliance
  g observe safe working practices in the use of electricity and in handling appliances

Unit 6
Home laundry appliances and domestic washers

Outcome 3
Demonstrate an understanding of dishwashers and apply this knowledge safely in a practical situation

Practical activities

1 Installing an automatic dishwasher.
2 Carrying out preventive maintenance on an automatic dishwasher.
3 Carrying out faultfinding procedures.
4 Removing and replacing modules.

Underpinning knowledge

The candidate knows
1 factors to be considered on installation of automatic dishwashers and can
  a describe procedures for unpacking
    i removal of transit packing
    ii removal of transit fittings
  b choose a position for the appliance
  c ensure the appliance is level
  d assess pressure or head of water supplies
  e describe procedures for connection of services to the appliance
    i water supply
    ii waste
    iii electrical supply

2 safety aspects of dishwashers and can
  a show how provision is made for earthing
  b describe door lock operation

3 how to use manufacturers data to determine the machine specification and can
  a state power ratings
    i motors
    ii heaters
  b describe operating cycles and data
    i wash load
    ii wash temperatures
    iii drying temperatures

4 how to interpret schematic and layout diagrams and can
  a recognise modules and their location
  b describe procedures for module replacement
    i heater
    ii motor(s) and pump
    iii timer
    iv thermostat
    v pressure switch
    vi solenoid valve(s)
    vii door seals
    viii water softener

5 the importance of preventive maintenance and can
  a describe procedures for
    i water inlet filter(s)
    ii internal filter(s)
    iii spray arms and nozzles
    iv door seals
    v hoses
    vi pump
    vii electrical plugs and connectors

6 factors associated with the wash and dry function and can
  a state the need to avoid overloading
  b describe the function of detergents and additives
  c assess the quality of washing and drying and identify problems

7 procedures for faultfinding on a dishwasher and can
  a select, use and care for instruments required for servicing appliances
  b select, use and care for tools required for servicing appliances
  c carry out and record diagnostic procedures
  d locate a fault to module level
  e remove and replace faulty module by a serviceable spare
  f reassemble and test the appliance
  g observe safe working practices in the use of electricity and in handling appliances

8 employees' responsibilities towards the maintenance of field service safety and can
  a state the importance of safe driving of service vehicle
  b state the need for observing safe practices on customers' premises
  c ensure safety of repair or installation on completion
  d report accidents which occur in the field to employer
  e report driving accidents to employer
    HASAWA 1974
    Reporting of Injuries (RIDDOR) 1995
    Notification of Accidents etc 1980
    Management of Health and Safety Regulations 1992
    (Regulation 12 Employee's Responsibility)

Unit 7
Cooking appliances (including microwave cookers)

Rationale

This unit concerns appliances which are designed to cook food either by boiling, flying, grilling, baking or microwave radiation.

There are three performance outcomes for this unit. The candidate can
1 demonstrate an understanding of electrically powered hobs and apply this knowledge in a practical situation
2 demonstrate an understanding of electric (conventional) ovens and fan ovens and apply this knowledge in a practical situation while observing safe practices
3 demonstrate an understanding of microwave ovens and apply this knowledge in a practical situation

Connections with other awards

This unit is designed to provide the underpinning knowledge for Unit 4, *Install products in customers' premises,* Unit 5, *Establish the status and condition of products,* Unit 6, *Rectify, and prevent faults through preventive servicing procedures,* Unit 7, *Diagnose faults in products to module level,* Unit 9, *Rectify faults through the replacement of modules,* Unit 11, *Reinstate product for customer operation,* and Unit 18, *Verify tools and equipment for the service activity* of the NVQ in Electrical and Electronics Servicing Level 2.

Assessment

The outcomes for this unit will be assessed on evidence resulting from

1 Practical activities
These are listed for each outcome in the next section. The assessment takes the form of a set assignment. In addition to practical activity the candidate may be required to answer oral questions in order to fulfil the learning requirements of the scheme. The time required for candidates to demonstrate the requisite skills will vary according to their abilities, motivation and prior experience.

2 Written test
The underpinning knowledge requirements are listed for each outcome below. These will be assessed by a multiple-choice question paper based on the test specifications outlined in the scheme.

Unit 7
Cooking appliances (including microwave cookers)

Outcome 1
Demonstrate an understanding of electrically powered hobs and apply this knowledge in a practical situation

Practical activities

1 Installing an electric hob.
2 Carrying out preventive maintenance on an electric hob.
3 Carrying out faultfinding procedures.
4 Removing and replacing modules.

Underpinning knowledge

The candidate knows
1 factors to be considered on installation of an electric hob and can
  a describe procedures for unpacking
    i removal of transit packing
    ii removal of transit fittings
  b choose a position for the appliance
  c ensure the appliance is level
  d describe procedures for connection of mains electricity to the appliance

2 safety aspects of electrically powered hobs and can
  a show how provision is made for earthing
  b describe warning methods to prevent burns

3 how to use manufacturers' data to determine the appliance specification and can state power ratings

4 hob element construction and operation and can
  a describe an enclosed boiling plate
  b describe radiant elements
    i for conventional hob
    ii for ceramic bob
  c describe a tungsten-halogen hob
  d describe energy regulator construction and operation
  e state the pan base characteristics needed for good heat flow

5 how to interpret schematic and layout diagrams and can
  a recognise modules and their location
  b describe procedures for module replacement

6 the importance of preventive maintenance and can
  a describe procedures for cleaning
    i general cleaning
    ii major spillages

7 procedures for faultfinding on electrically powered hobs and can
  a select, use and care for instruments required for servicing appliances
  b select, use and care for tools required for servicing appliances
  c carry out and record diagnostic procedures
  d locate a fault to module level
  e remove and replace faulty module by a serviceable spare
  f reassemble and test the appliance
  g observe safe working practices in the use of electricity and in handling appliances

8 procedures and practices for moving and storing loads in workshop and field service and can
  a define a load
  b describe hazards associated with moving loads
    i back injury
    ii injury to hands and feet
  c define the centre of gravity of a load
  d explain the use of gloves
  e describe the effect of load surface on grip
  f explain the need to avoid injury to other people when moving a load
  g describe how to minimise lifting
    i plan the move
    ii clear obstacles away
    iii use the most appropriate method
    iv adopt correct posture when lifting
  h describe techniques for stable stacking of goods Manual Handling Operations Regulations 1992

Unit 7
Cooking appliances (including microwave cookers)

Outcome 2
Demonstrate an understanding of electric (conventional) ovens and fan ovens and apply this knowledge in a practical situation

Practical activities

1 Installing an electric (conventional) oven and fan oven.
2 Carrying out preventive maintenance on an electric (conventional) oven and fan oven.
3 Carrying out faultfinding procedures.
4 Removing and replacing modules.

Underpinning knowledge

The candidate knows
1 factors to be considered on installation of electric (conventional) ovens and fan ovens and can
  a describe procedures for unpacking
    i removal of transit packing
    ii removal of transit fittings
  b choose a position for the appliance
  c ensure the appliance is level
  d describe procedures for connection of mains electricity to the appliance

2 safety aspects of electric (conventional) ovens and fan ovens and can
  a show how provision is made for earthing
  b describe warning methods to prevent bums

3 how to use manufacturers' data to determine the oven specification and can
  a state power ratings of elements
  b state the method of temperature control
  c identify fan motor type and power rating
  d identify a self-cleaning oven

4 how hob and oven are combined in a free-standing unit or built-in unit and can
  a recognise a combined hob and electric oven (conventional or fan oven)
  b describe the combined controls for hob and oven

5 how to interpret schematic and layout diagrams and can
  a recognise modules and their location
  b describe procedures for module replacement

6 the importance of preventive maintenance and can
  a describe procedures for
    i routine cleaning including self cleaning ovens
    ii cleaning and maintaining oven door seals

7 procedures for faultfinding on electric (conventional) ovens and fan ovens and can
   a select, use and care for instruments required for servicing appliances
   b select, use and care for tools required for servicing appliances
   c carry out and record diagnostic procedures
   d locate a fault to module level
   e remove and replace faulty module by a serviceable spare
   f reassemble and test the appliance
   g observe safe working practices in the use of electricity and in handling appliances

Unit 7
Cooking appliances (including microwave cookers)

Outcome 3
Demonstrate an understanding of microwave ovens and apply this knowledge safely in a practical situation

Practical activities

1 Installing a microwave oven.
2 Carrying out preventive maintenance on a microwave oven.
3 Carrying out faultfinding procedures.
4 Removing and replacing modules.

Underpinning knowledge

The candidate knows
1 factors to be considered on installation of a microwave oven and can
  a describe procedures for unpacking
    i removal of transit packing
    ii removal of transit fittings
  b choose a position for the appliance
  c ensure the appliance is level
  d describe procedures for connection of mains electricity to the appliance

2 operating principles of microwave ovens and can
  a state the frequency and wavelength of the electromagnetic wave employed
  b describe the function of the magnetron module
  c state typical power output
  d state the function of the magnetron high voltage power supply
  e state the function of the low voltage power supply

3 the propagation behaviour of microwaves and can
  a describe how metal foil, film and perforated metal sheet reflect microwaves
  b state the need for rf sealing
  c identify 'microwave transparent' materials
  d identify microwave absorbers (including food)
  e describe the function of
    i turntable
    ii microwave stirrer
    iii rotating aerial
  f state the need for 'standing time' in cooking

4 safety aspects of a microwave oven and can
  a show how provision is made for earthing
  b describe door lock operation and interlocking
  c identify high voltage hazards
    i transformer secondary
    ii charged capacitor
  d describe microwave radiation hazard

5 how to use manufacturers' data to determine the appliance specification and can
  a identify operating cycles
  b state power ratings
  c describe microprocessor controller functions and self diagnostics

6 how to interpret schematic and layout diagrams and can
  a recognise modules and their location
  b describe procedures for module replacement

7 the importance of preventive maintenance and can
  a describe procedures for cleaning
  b inspect the power cable

8 procedures for faultfinding on a microwave oven and can
  a select, use and care for instruments required for servicing appliances
  b select, use and care for tools required for servicing appliances
  c carry out and record diagnostic procedures
  d locate a fault to module level
  e remove and replace faulty module by a serviceable spare
  f reassemble and test the appliance
  g observe safe working practices in the use of electricity and in handling appliances

9 employees' responsibilities towards the maintenance of field service safety and can
  a state the importance of safe driving of service vehicle
  b state the need for observing safe practices on customers' premises
  c ensure safety of repair or installation on completion
  d report accidents which occur in the field to employer
  e report driving accidents to employer
    HASAWA 1974
    Reporting of Injuries (RIDDOR) 1995
    Notification of Accidents etc 1980
    Management of Health and Safety Regulations 1992
    (Regulation 12 Employee's Responsibility)

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Unit 8
Refrigeration systems and portable air conditioning systems

Rationale

This unit concerns the application of the refrigeration cycle in appliances which are used for food conservation or air conditioning.

There are two performance outcomes for this unit. The candidate can
1 demonstrate an understanding of refrigerators, freezers and fridge freezers and apply this knowledge in practical situation
2 demonstrate an understanding of portable air conditioning systems and apply this knowledge in a practical situation.

Connections with other awards

This unit is designed to provide the underpinning knowledge for Unit 4, *Install products in customers' premises,* Unit 5, *Establish the status and condition of products,* Unit 6, *Rectify and prevent faults through preventive servicing procedures,* Unit 7, *Diagnose faults in products to module level,* Unit 9, *Rectify faults through the replacement of modules,* Unit 11, *Reinstate product for customer operation,* and Unit 18, *Verify tools and equipment for the service activity* of the NVQ in Electrical and Electronics Servicing Level 2.

Assessment

The outcomes for this unit will be assessed on evidence resulting from:

1 Practical activities
These are listed for each outcome in the next section. The assessment takes the form of a set assignment. In addition to practical activity the candidate may be required to answer oral questions in order to fulfil the learning requirements of the scheme. The time required for candidates to demonstrate the requisite skills will vary according to their abilities, motivation and prior experience.

2 Written test
The underpinning knowledge requirements are listed for each outcome below. These will be assessed by a multiple-choice question paper based on the test specifications outlined in the scheme.

Unit 8
Refrigeration systems and portable air conditioning systems

Outcome 1
Demonstrate an understanding of refrigerators, freezers and fridge freezers and apply this knowledge in a practical situation

Practical activities

1 Installing refrigerators, freezers and fridge freezers.
2 Carrying out preventive maintenance on refrigerators freezers and fridge freezers.
3 Carrying out faultfinding procedures.
4 Removing and replacing modules.

Underpinning knowledge

The candidate knows
1 refrigeration principles and can
   a distinguish between pressure and vacuum
   b define atmospheric, absolute and gauge pressure
   c describe the pressure and temperature relationship for a refrigerant
   d define latent heat and sensible heat
   e describe the sealed system compression type refrigeration cycle

2 practical refrigeration systems and can
   a describe the construction and operation of
      i the compressor
      ii condenser
      iii dryer/filter unit
      iv capillary tube
      v heat exchanger
      vi evaporator and collector
   b state the method of temperature control
   c explain the star rating system for refrigerators and freezers
   d describe methods for frost dispersal
      i auto defrost method
      ii frost free systems
   e explain the importance of thermal insulation
   f list refrigerants for compression systems
      CFC types
      i CFC(R12)
      ii HCFC
      iii HFC
      CFC substitutes
      iv 134A
      v R49A
      vi R600A
      vii butane
   g describe safety aspects of the use of refrigerants
   h describe how refrigerator and freezer are combined in a free-standing unit or built-in unit

3 factors to be considered on installation of refrigerators, freezers and fridge freezers and can
   a describe procedures for unpacking
      i removal of transit packing
      ii removal of transit fittings
   b choose a position for the appliance
   c ensure the appliance is level
   d describe procedures for repositioning the door of refrigerators, upright freezers and fridge freezers
   e describe procedures for connection of mains electricity to the appliance

4 safety aspects of refrigerators, freezers and fridge freezers and can
   a show how provision is made for earthing
   b describe how to avoid 'freezer burn' with iced foods
   c describe methods for safe disposal of unserviceable appliances

5 how to use manufacturers' data to determine the specification of refrigerators, freezers and fridge freezers and can
   a state the method of temperature control
   b identify compressor motor type and power rating
   c state refrigerant type
   d state power ratings of
      i anti-condensation heater
      ii defrost heater
      iii interior light
   e state energy efficiency class with reference to BS/EN 153
   f state frozen food volume and freezing capacity
   g state temperature rise time or power cut safe time

6 how to interpret schematic and layout diagrams and can
   a recognise modules and their location
   b describe procedures for module replacement

7 the importance of preventive maintenance on refrigerators, freezers and fridge freezers and can
   a describe procedures for
      i routine cleaning of interior and exterior surfaces
      ii cleaning and maintaining door seals
      iii defrosting
      iv cleaning compressor and condenser

8 procedures for faultfinding on refrigerators, freezers and fridge freezers and can
  a select, use and care for instruments required for servicing appliances
  b select, use and care for tools required for servicing appliances
  c carry out and record diagnostic procedures
  d locate a fault to module level
  e remove and replace faulty module by a serviceable spare
  f reassemble and test the appliance
  g observe safe working practices in the use of electricity and in handling appliances

9 the absorption type refrigeration cycle and can
  a state the refrigerant used for absorption systems
  b describe practical absorption technology refrigerators
    i sealed system
    ii heater element
    iii thermostat
    iv interior light
  c describe procedures for restoring the operation of a faulty refrigerator which uses absorption technology

Outcome 2
Demonstrate an understanding of portable air conditioning systems (integral condenser and split systems) and apply this knowledge in a practical situation

Practical activities

1 Installing portable air conditioning systems.
2 Carrying out preventive maintenance on portable air conditioning systems.
3 Carrying out faultfinding procedures.
4 Removing and replacing modules.

Underpinning knowledge

The candidate knows
1 the principles of air conditioning and can
  a describe the effect of ambient temperature and air flows on cooling
  b describe the dehumidifying action of an air conditioner

2 practical air conditioning systems and can
  a describe how the sealed system compression type refrigeration cycle is employed in
    i integral condenser types
    ii split systems
  b describe additional features of portable systems
    i electromechanical controller
    ii electronic controller
    iii flexible refrigerant tube make and break couplings
    iv disposal of condensate
    v auxiliary electric heating
    vi air filter

3 factors to be considered on installation of portable air conditioning systems and can
  a describe procedures for unpacking
    i removal of transit packing
    ii removal of transit fittings
  b choose a position for the appliance
  c ensure the appliance is level
  d make provision for venting or siting condenser unit
  e describe procedures for connection of mains electricity to the appliance

4 safety aspects of portable air conditioning systems and can
  a show how provision is made for earthing
  b state precautions to be taken when dealing with the sealed system

5 how to use manufacturers data to determine the specification of portable air conditioning systems and can
   a state cooling capacity
   b state the maximum dehumidification rate
   c state the method of temperature control
   d identify motor types and power ratings
   e state heater power ratings
   f describe controller functions

6 how to interpret schematic and layout diagrams and can
   a recognise modules and their location
   b describe procedures for module replacement

7 the importance of preventive maintenance and can
   a describe procedures for routine cleaning
      i compressor housing
      ii condenser and fan
      iii cooling/heating fan
      iv air filter
   b describe procedures for filter replacement

8 procedures for faultfinding on portable air conditioning systems and can
   a select, use and care for instruments required for servicing appliances
   b select, use and care for tools required for servicing appliances
   c carry out and record diagnostic procedures
   d locate a fault to module level
   e remove and replace faulty module by a serviceable spare
   f reassemble and test the appliance
   g observe safe working practices in the use of electricity and in handling appliances

9 employees' responsibilities towards the maintenance of field service safety and can
   a state the importance of safe driving of service vehicle
   b state the need for observing safe practices on customers' premises
   c ensure safety of repair or installation on completion
   d report accidents which occur in the field to employer
   e report driving accidents to employer
      HASAWA 1974
      Reporting of Injuries (RIDDOR) 1995
      Notification of Accidents etc 1980
      Management of Health and Safety Regulations 1992
      (Regulation 12 Employee's Responsibility)

10 procedures and practices for moving and storing loads in workshop and field service and can
- a define a load
- b describe hazards associated with moving loads
  - i back injury
  - ii injury to hands and feet
- c define the centre of gravity of a load
- d explain the use of gloves
- e describe the effect of load surface on grip
- f explain the need to avoid injury to other people when moving a load
- g describe how to minimise lifting
  - i plan the move
  - ii clear obstacles away
  - iii use the most appropriate method
  - iv adopt correct posture when lifting
- h describe techniques for stable stacking of goods

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