

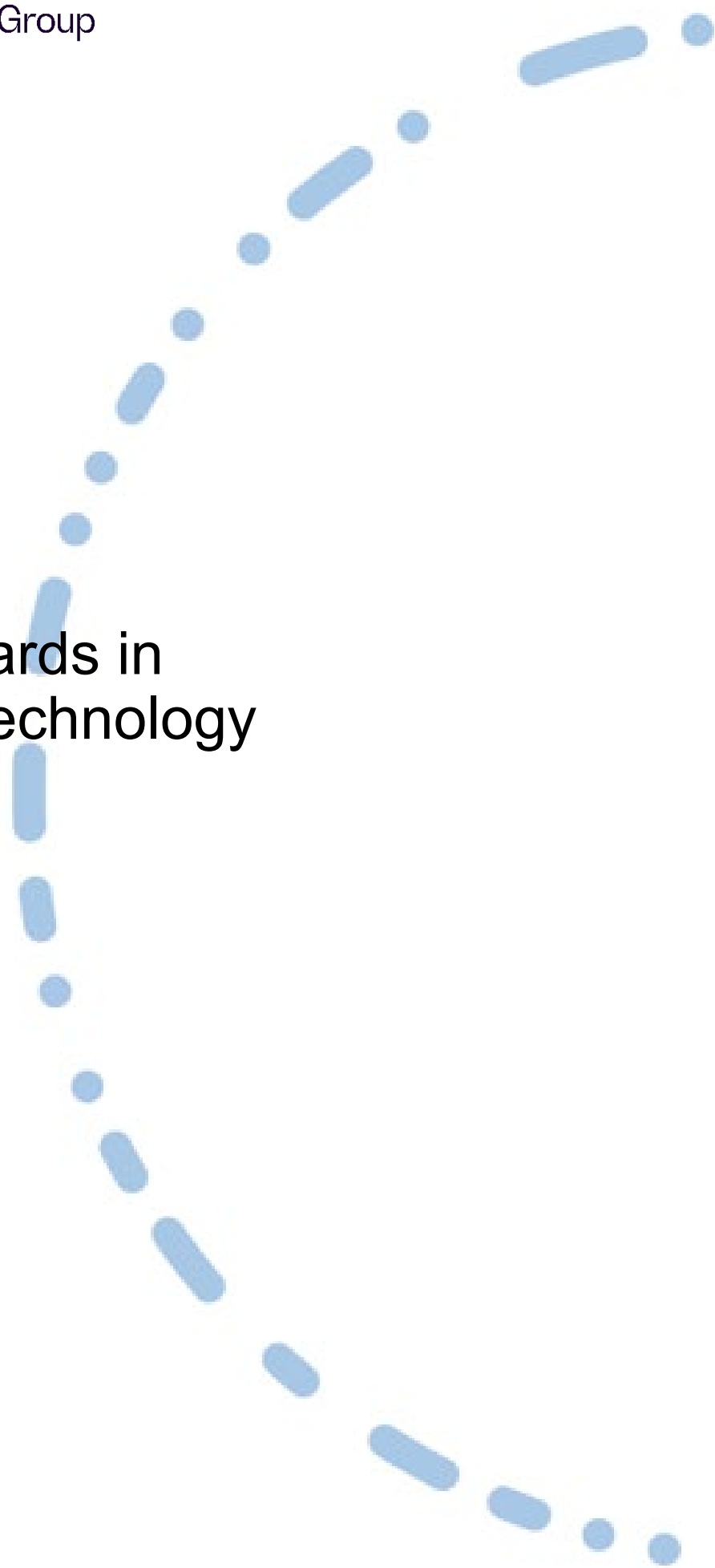


Part of the
Enginuity Group

Qualification Manual

EAL Level 3 Awards in Environmental Technology Systems

ISSUE: 11 (0222)



This qualification manual relates to the following awards:

- EAL Level 3 Award in Understanding the Fundamental Principles and Requirements of Environmental Technology Systems. Qualification number: 600/0665/1
- EAL Level 3 Award in the Installation of Small Scale Solar Photovoltaic Systems. Qualification number: 600/5175/9
- EAL Level 3 Award in the Installation and Maintenance of Heat Pump Systems (Non-refrigerant Circuits). Qualification number: 600/5253/3

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1.0 About EAL

For over fifty years, EAL has been the specialist awarding organisation for engineering, manufacturing, building services and related sectors. Developed to the highest technical standards, our qualifications reflect ever-changing industry and regulatory needs. We support the providers of our qualifications with an unparalleled level of service to ensure that learners are well prepared to take the next step in their journeys, whether study, an apprenticeship or work.

Through industry partnerships with EAL centres and training providers, decades of experience supporting our core sectors, and our role as part of the Enginuity Group, we have built unrivalled knowledge and understanding of employer skills needs. As a result, EAL's skills solutions, including apprenticeship End-Point Assessment, External Quality Assurance and qualifications are respected and chosen by employers to deliver real lifelong career benefits for all our learners. That's why in the last ten years, 1.2 million people across the UK have taken EAL qualifications.

2.0 Introduction to the Qualification

What are these qualifications?

These qualifications in environmental technology have been developed to enable the building services engineering sector to play its role in meeting the carbon reduction targets set by Government.

Lowering energy consumption, reducing emissions and conserving water cannot be achieved unless the sector designs, installs and maintains renewable and environmental technologies, and provides the best advice to customers.

This suite of qualifications has been developed from units that reflect the national occupational standards to enable a highly skilled workforce in the building services engineering sector. The achievement of the awards in this suite will encourage an employee to value their contribution to the workplace, and it will develop their skills and potential. The performance units within the awards in this suite may be assessed through practical activities in the workplace or as appropriate; in simulated conditions.

Who are these qualifications for?

- Those who wish to learn about micro-renewable energy and water conservation technologies,
- Those who wish to become a competent in the installation *or* installation and maintenance of environmental technologies,
- Those who to further their career building services sector.

What do these qualifications cover?

The qualifications cover a wide range of environmental technologies The qualifications consist of knowledge units and (and/or) performance units. The units are listed in Section 3 of this manual.

2.1 Support for these Qualifications

The qualifications:

- are regulated,
- were developed in conjunction with industry and training providers.

2.2 Achievement of the Qualification & ‘Stand Alone Units’

The qualification is awarded when all the necessary units have been achieved. The centre will then be able to apply for the learner’s Award. The learner will also receive a Certificate of Unit Credit, listing all the units they have achieved.

However if they don’t manage to complete the full qualification learners can still claim a Certificate of Unit Credit for the units achieved therefore, they still have proof of their ability and could complete the qualification at a later date.

The learner must complete the relevant knowledge units prior to the performance units. See section 3 for further details.

2.3 Relation to Other Qualifications

These qualifications relates to the following:

- EAL Qualifications in BS7671,
- EAL Diploma in Inspecting and Testing Electrotechnical Systems and Equipment,
- EAL Certificate in In-Service Inspection and Testing of Electrical Equipment (PAT),
- EAL Qualifications in building services engineering.

Details on these can be obtained from the EAL Website or alternatively contact:

EAL Customer Experience

Tel: +44 (0)1923 652 400

Email: Customer.Experience@eal.org.uk

2.4 Qualification Support Materials

The following materials are available for this qualification with no additional charge to centres:

- **Performance Units:**
These documents allow both the learner and the assessor to record the progress through the qualification. They contain the performance to be assessed, and the evidence required from the learner to demonstrate their competence.
- **Knowledge Units:**
Contain the learning outcomes and assessment criteria.
- **Delivery Advice Documents:**
The delivery advice is tailored specifically for each knowledge unit. The delivery advice is guidance and can be used to support and inform the in-centre schemes of work and learning plans.
- **PowerPoint Slides:**
Each knowledge unit has a tailored set of referenced slides which can be used in presentations, handouts, or formative assessments.
- **Performance Assessment Plan and Evidence Record (X200):**
This allows effective and holistic assessment planning and cross tracking of the learner portfolio to the performance units.

3.0 Rule of Combination

The qualification will be obtained by the learner once they have completed the necessary units that make up the rule of combination.

This qualification has 15 Guided Learning Hours (GLH) and a Total Qualification Time (TQT) of 20 hours (this is notational time required by the learner to complete the qualification).

EAL Level 3 Award in Understanding the Fundamental Principles and Requirements of Environmental Technology Systems

Knowledge Unit: *Must be completed:*

EAL Code	Knowledge Unit Title	Level	Credit	GLH	Ofqual Code
QET3/001	<input type="checkbox"/> Understand the fundamental principles and requirements of environmental technology systems	3	2	15	K/602/3138

EAL Level 3 Award in the Installation of Small Scale Solar Photovoltaic Systems

This qualification has 50 Guided Learning Hours (GLH) and a Total Qualification Time (TQT) of 60 hours (this is notational time required by the learner to complete the qualification).

The units with this qualification are intended to be delivered in the following order:

- QET3/002SPV and QET3/003SPV.

Knowledge Units: *Must be completed:*

EAL Code	Knowledge Unit Title	Level	Credit	GLH	Ofqual Code
QET3/002SPV	<input type="checkbox"/> Know the requirements to install, commission and handover small scale solar photovoltaic systems	3	4	35	D/602/3086

Performance Unit: *Must be completed:*

EAL Code	Performance Unit Title	Level	Credit	GLH	Ofqual Code
QET3/003SPV	<input type="checkbox"/> Install, commission and handover small scale solar photovoltaic systems	3	2	15	K/602/3088

EAL Level 3 Award in the Installation and Maintenance of Heat Pump Systems (Non-refrigerant Circuits)

This qualification has 80 Guided Learning Hours (GLH) and a Total Qualification Time (TQT) of 100 hours (this is notational time required by the learner to complete the qualification).

The units with this qualification are intended to be delivered in the following order:

- QET3/002HP, QET3/003HP, QET3/004HP, QET3/005HP
- Or*
- QET3/002HP, QET3/004HP, QET3/003HP, QET3/005HP.

Knowledge Units: *Must be completed:*

EAL Code	Knowledge Unit Title	Level	Credit	GLH	Ofqual Code
QET3/002HP	<input type="checkbox"/> Know the requirements to install, commission and handover heat pump systems (non-refrigerant circuits)	3	4	35	Y/602/3054
QET3/004HP	<input type="checkbox"/> Know the requirements to inspect, service and maintain heat pump system installations (non-refrigerant circuits)	3	2	15	F/602/3078

Performance Units: *Must be completed:*

EAL Code	Performance Unit Title	Level	Credit	GLH	Ofqual Code
QET3/003HP	<input type="checkbox"/> Install, commission and handover heat pumps (non-refrigerant circuits)	3	2	15	D/602/3072
QET3/005HP	<input type="checkbox"/> Inspect, service and maintain heat pump installations (non-refrigerant circuits)	3	2	15	L/602/3083

4.0 Centre & Qualification Approval

Centres wishing to run the qualification will need to comply with this Qualification Manual and EAL's centre approval criteria for this qualification. Centres must also put in place the appropriate physical and human resources and administration systems to effectively run the qualification.

For *existing* EAL Centres to put the qualification on your centre remit:

- The approval form can be downloaded from the centre area of the EAL Website or alternatively obtained from the EAL Centre Operations Manual. Please contact your EQA, or EAL Customer Services (see below) if you need any assistance.

For *non* EAL Centres to gain centre approval to run the qualification:

- Please contact the EAL Customer Experience Department who will be delighted to hear from you:
Tel: +44 (0)1923 652 400
Email: Customer.Experience@eal.org.uk

5.0 Profiles & Requirements

The personnel involved in these qualifications must meet the requirements in this section for the applicable Awards delivered.

5.1 Assessors

Assessor must:

- Have a relevant assessor qualification (A1 and A2 or TDLB D32 and D33 and evidence of CPD to A1/A2 standards).

Or

- Alternative recorded evidence to confirm assessor competence to A1 standards.

Assessor must also have evidence of competence in the applicable environmental technology system's design, installation, testing, commissioning, inspection, service, and maintenance for the units being assessed. Evidence may be in the form of a qualification or certificate issued by a recognised awarding/certification organisation or other recorded evidence to confirm technical competence that covers the knowledge and practical skill outcomes contained within the qualification units being assessed.

The occupational competence of assessors must be updated on a regular basis and will be periodically reconfirmed by EAL as part of the quality assurance arrangements.

It is the responsibility of each assessor to identify and make use of opportunities for CPD, such as industry conferences, access to trade journals, and SSC and Professional Body/Trade Association events, at least on an annual basis to enhance and upgrade their professional development and technical knowledge. It is imperative that records are kept of all such CPD opportunities/occasions and that they provide evidence of cascading such technical knowledge and industry intelligence to all relevant colleagues.

5.2 Internal Verifiers

Internal verifiers must:

- Have a relevant internal verifier qualification (V1 or TDLB D34 and evidence of CPD to V1 standards)

Or

- Alternative recorded evidence to confirm internal verifier competence to A1 standards.

Internal verifiers must also have a building services engineering occupational experience evidenced by having a building services engineering sector related qualification at N/SVQ Level 3 or proven sector competence/experience plus access to relevant "occupational expertise" to enable them to conduct their role as internal verifier appropriately.

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The occupational competence of internal verifiers must be updated on a regular basis and will be periodically reconfirmed by EAL. Where internal verifiers have proven sector competence/experience plus access to relevant “occupational expertise” this arrangement will also be quality assured by EAL. It is the responsibility of each IV to identify and make use of opportunities for CPD, such as industry conferences, access to trade journals, and sector skills council and Professional Body/Trade Association events, at least on an annual basis to enhance and upgrade their professional development and technical knowledge. It is imperative that records are kept of all such CPD opportunities or occasions.

5.3 Learners

The entry requirements for learners are detailed here for each of the awards in this suite:

EAL Level 3 Award in Understanding the Fundamental Principles and Requirements of Environmental Technology Systems

Learner entry requirements:

There are no specific learner prerequisite entry requirement to access this qualification; however, it is recommended that delivery centres have processes in place to confirm that learners have the potential and where applicable, relevant support to achieve the learning outcomes.

EAL Level 3 Award in Small Scale Solar Photovoltaic systems:

Learner entry requirements:

N/SVQ 3 in Electrical Installation (Buildings and Structures) or equivalent earlier certification that provides evidence of competence. In addition, if not included in the above, current certification of 7671 Requirements for Electrical Installations.

Note: Stand alone vocationally related qualifications (technical certificates) are not acceptable as an alternative to the NVQ awards listed above.

EAL Level 3 Award in the Installation and Maintenance of Heat Pump Systems (Non-refrigerant Circuits):

Learner entry requirements:

- N/SVQ Level 2/3 in Plumbing or equivalent earlier certification that provides evidence of competence; or
- N/SVQ Level 2/3 in Heating and Ventilating (Domestic Installation) or equivalent earlier certification that provides evidence of competence; or
- N/SVQ Level 2/3 in Heating and Ventilating (Industrial and Commercial Installation) or equivalent earlier certification that provides evidence of competence; or
- N/SVQ Level 2/3 in Oil-Fired Technical Services or equivalent earlier certification that provides evidence of competence; or
- N/SVQ Level 2/3 in Gas Installation and Maintenance or equivalent earlier certification that provides evidence of competence.

In addition, if not included in the above current certification in relation to:

- Water Regulations/Water Byelaws (WRAS or equivalent)
- Energy Efficiency for Domestic Heating (C&G 6084 or equivalent)

Note: Stand alone vocationally related qualifications (technical certificates) are not acceptable as an alternative to the NVQ awards listed above.

5.4 Expert Witnesses

Where “Expert Witnesses” are used in the assessment process they must be:

- Sector competent individuals who can attest to the learner's performance in the workplace.
- It is not necessary for expert witnesses to hold an assessor qualification, as a qualified assessor must assess the performance evidence provided by an expert witness.
- Evidence from expert witnesses must meet the tests of validity, reliability, authenticity and sufficiency.
- Expert witnesses will need to demonstrate:
 - they have relevant current knowledge of industry working practices and techniques,
 - that they have no conflict of interest in the outcome of their evidence.

5.5 Teaching Staff

This relates to staff that are teaching/training only; assessor requirements are given in 5.1.

Teaching staff must:

- Have 2 years experience in teaching/training.
or
- Are working towards an appropriate teaching/training qualification (e.g. Cert Ed or Learning & Development trainer units).
or
- Hold an appropriate teaching/training qualification (e.g. Cert Ed or Learning & Development trainer units).

Must also have:

- Knowledge and understanding of the occupation covered by this qualification.
- Knowledge and understanding of the structure and content of this qualification.

5.6 Personnel Conducting the External Assessment

This relates to staff that are conducting and controlling exam sessions only; assessor requirements are given in 5.1.

These personnel must:

- Have experience in conducting and controlling exam sessions or be supervised, conducting this function, by an individual experienced in conducting and controlling exam sessions.
- Have knowledge, understanding and compliance to EAL examination procedures (see the EAL Centre Operations Manual).

5.7 Physical Resources

Safe working is a key issue and all practical activities conducted within the centre must be subject to up to date risk assessments. All learners must be properly supervised and wear the correct personal protective equipment. Arrangements for first aid and emergency action in case of accident must be in place.

The required resources will be clearly detailed within the performance units if simulation/replication is to take place. See Section 6.3 for details about simulation

6.0 Assessment

The assessments of the units within the qualifications of this suite involve the following aspects:

- Knowledge Units: External (EAL marked) on–screen exams
- Performance Units: Locally assessed, either through practical activities in the workplace or as appropriate; in simulated conditions.

Learners must pass all the assessments to achieve the qualification. The learner **must** complete the relevant knowledge units prior to the performance units.

EAL will monitor and externally verify the internal and external assessments conducted at the centre. The EAL Centre Operations Manual must be followed along with this section.

The following sub-sections will give an overview of the internal and external assessments.

6.1 External (EAL Marked) Assessment for Knowledge Units

These are separate on-screen examinations, for each **knowledge unit** which assess the unit's learning outcomes and assessment criteria. The learner will be assessed using various question types.

6.2 Assessment of Performance Units

The environment, in which the evidence and the quantity of evidence for **Performance Units** must be assessed, is detailed in each EAL Performance Unit.

Evidence that is sourced from the real working environment for **Performance Units** must be naturally occurring and can be generated by:

- Direct observation of performance in the workplace by a qualified assessor and/or testimony from an expert witness subject to the activity being assessed. (This will be the primary source of evidence).
- Candidate's reflective account of performance.
- Work plans and work based products e.g. diagrams, drawings, specifications, customer testimony, authorised and authenticated photographs/images and audiovisual records of work completed.
- Evidence from prior achievements that demonstrably match the requirements of the Performance Unit.
- Witness testimony (See Section 5).

Meeting the assessment requirements of **Performance Units** will need initial discussions and assessment planning between the learner and assessor, as an essential activity to identify opportunities to assess real working environment evidence, gaps that need to be filled or opportunities to recognise the prior achievement of the learner.

Competence must be demonstrated **consistently over a period of time**. However Summit Skills the sector skills council, does not wish to stipulate what that period of time might be as this is a decision for the Assessor. Based on their own professional judgement Assessors must be capable of identifying when competence has been demonstrated by the learner.

Simulation and Simulated Conditions (Performance Units)

The unit may be assessed through practical activities in the work place or as appropriate; in simulated conditions. Where simulated conditions are used, particular attention is drawn to the requirement for 'real working conditions' and a real working environment'.

Simulation and simulated conditions is defined as an environment in which simulated activities take place involving the replication of a real working environment. The criteria for which must be to supply fit-for-purpose tools, equipment, full-size components, realistic deadlines and other commercial requirements.

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A real working environment is defined as an environment in which real work activities take place under real working conditions in keeping with real commercial situations.

The performance units are designed to allow the assessment centre the opportunity to assess the candidate in either the workplace or in simulated conditions. Where simulated conditions are used a practical assignment is detailed within the performance unit.

6.3 External Quality Control of Assessment

There are two major activities in which EAL interacts with the Centre in relation to the External Quality Control of Assessment for this qualification and these are:

- **Recognition:** When a Centre decides to offer the qualification, the EAL External Quality Assurer (EQA) ensures that the Centre is suitably equipped and prepared for delivery and assessment.
- **Engagement:** Throughout the ongoing delivery of the qualification EAL, through EQA monitoring and other mechanisms will review the quality and consistency of assessment and internal quality assurance and recommend actions to address issues of concern.

Recognition

In granting approval, EAL, normally through its EQAs, will ensure that the prospective Centre:

- Meets any procedural requirements specified by EAL.
- Has sufficient and appropriate physical and staff resources.
- Meets relevant health and safety and/or equality and access requirements.
- Has a robust plan for the delivery, assessment and QA for the qualifications (including, where appropriate, scope for involving employers).

EAL may decide to visit the Centre to view the evidence provided.

Engagement

EAL, through EQA Engagement and other mechanisms will ensure that:

- A strategy is developed and deployed for the on-going monitoring of the centre – this will be based on an active risk assessment of the Centre, and will include details of the learner, assessor and internal quality assurer's sampling strategy and the rationale behind this.
 - The Centre's internal quality assurance processes are effective in learner assessment.
 - Outcomes of internal assessment are verified, through sampling, to ensure standards are being maintained.
 - Sanctions are applied to a Centre where necessary and that corrective actions are taken by the Centre and monitored by the EQA.
- Reviews of EAL's external auditing arrangements are undertaken.

Appendix 1: Centre Setting Specifications for Examinations

<p>Unit ET 001 Know the fundamental working principles, installation options and regulatory requirements for micro-renewable energy and water conservation technologies</p> <p>Test Specification</p>	
<p>Number of questions: 25</p> <p>Closed Book</p> <p>Each test will cover the knowledge learning outcomes of the unit as follows:</p>	
Knowledge learning outcome:	Approximate coverage:
1.0 Know the fundamental working principles of micro-renewable energy and water conservation technologies	36%
2.0 Know the fundamental requirements of building location/building features for the potential to install micro-renewable energy and water conservation systems to exist	36%
3.0 Know the fundamental regulatory requirements relating to micro-renewable energy and water conservation technologies	20%
4.0 Know the typical advantages and disadvantages associated with micro-renewable energy and water conservation technologies	8%

Unit ET 02 PV
Know the requirements to install, commission and handover solar photovoltaic systems

Test Specification

Number of questions: 45

Closed Book

Each test will cover the underpinning knowledge and understanding relevant to the unit as follows:

Learning Outcome:	Approximate coverage:
1.0 Know the health and safety risks and safe systems of work associated with solar photovoltaic system installation work	4%
2.0 Know the requirements of the relevant regulations/ standards relating to practical installation, testing and commissioning activities for solar photovoltaic system installation work	5%
3.0 Know the fundamental differences between a.c and d.c circuits within solar photovoltaic systems	4%
4.0 Know the purpose of solar photovoltaic system components	7%
5.0 Know the types, silicon characteristics and typical conversion efficiencies of solar photovoltaic modules	11%
6.0 Know the fundamental design principles used to determine solar photovoltaic system module array size and position requirements	11%
7.0 Know the preparatory work required for solar photovoltaic system installation work	4%
8.0 Know the layouts and the requirements for installing solar photovoltaic module arrays	25%
9.0 Know solar photovoltaic system d.c and a.c circuit installation layouts within the scope of the relevant Engineering recommendation for grid tied systems	4%
10.0 Know solar photovoltaic system protection techniques and components	5%
11.0 Know the requirements to test and commission solar photovoltaic systems	16%
12.0 Know the requirements to handover solar photovoltaic systems	4%

Unit ET 02 HP
Know the requirements to install, commission and hand over heat pump systems(non-refrigerant circuits)
Test Specification

Number of questions: 50

Closed Book

Each test will cover the knowledge learning outcomes of the unit as follows:

Knowledge learning outcome:	Approximate coverage:
1.0 Know the health and safety risks and safe systems of work associated with heat pump system installation work (non-refrigerant circuits)	4%
2.0 Know the requirements of relevant regulations/standards relating to practical installation, testing and commissioning activities for heat pump installation work	6%
3.0 Know the purpose and operational characteristics of heat pump unit and heat pump system components	4%
4.0 Know the different types of heat pump units and system arrangements for hydraulic emitter circuits	12%
5.0 Know the fundamental principles of heat pump selection and system design that are common to both air and ground source heat pumps	16%
6.0 Know the fundamental design principles for ground source 'closed loop' heat pump collector circuit design, component sizing and installation	18%
7.0 Know the layouts of 'open loop' water filled heat pump collector circuits	2%
8.0 Know the fundamental design considerations and principles that are specific to air source heat pumps	6%
9.0 Know the preparatory work required for heat pump installation work	6%
1.0 Know the requirements to install and test heat pump systems (non-refrigerant circuits)	10%
11.0 Understand the requirements to commission heat pump system installations (non-refrigerant circuits)	8%
12.0 Understand the requirements to handover heat pump system installations	8%

Unit ET 04 HP
Know the requirements to inspect, service and maintain heat pump system installations
(non-refrigerant circuits)
Test Specification

Number of questions: 20

Closed Book

Each test will cover the knowledge learning outcomes of the unit as follows:

Learning Outcome:	Approximate coverage:
1.0 Know the requirements for the non-refrigerant circuit routine service and maintenance of heat pump system installations	55%
2.0 Know how to diagnose faults in heat pump system installations	25%
3.0 Know how to rectify non-refrigerant circuit faults in heat pump system installations	20%

Appendix 2: Learner Registration & Certification

Learners must be registered with EAL on a code which relates to the qualification -this must be completed prior to assessment. Both learner registration and certification can be completed online at the EAL Website www.eal.org.uk. For paper based registration and certification use the appropriate forms. These are located on the EAL Website, for guidance on registration and certification please refer to the Registration and Certification User Guide. To register the learner on the chosen qualification code:

Qualification Title	Code
EAL Level 3 Award in Understanding the Fundamental Principles and Requirements of Environmental Technology Systems.	600/0665/1
EAL Level 3 Award in the Installation of Small Scale Solar Photovoltaic Systems.	600/5175/9
EAL Level 3 Award in the Installation and Maintenance of Heat Pump Systems (Non-refrigerant Circuits).	600/5253/3
