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Qualification

Specification

EAL Level 3 Technical Occupational Entry in Plumbing and Domestic Heating (Diploma)

Qualification Number: 610/3914/7

Version 1

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# 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.

## 1.1 Equal Opportunities and Diversity

EAL expects its Centres to enable learners to have equal access to training and assessment for qualifications in line with equalities legislation. Further details can be located in the EAL Equal Opportunities and Diversity Policy:

## 1.2 Customer Experience and Feedback

Customer Experience is a fundamental part of EAL’s commitment to you. EAL aims to ensure that all customers receive a high-quality efficient service. We are always interested in feedback and if you have any comments or feedback on our qualifications, products or services, please contact the Customer Experience team:

EAL Customer Experience

Tel: +44 (0)1923 652 400

Email: Customer.Experience@eal.org.uk

# Introduction to the Qualification

What is this qualification?

This qualification is for adults only (19+) and aligns to the knowledge, skills, and behaviours (KSBs) in the Plumbing and Domestic Heating Technician Apprenticeship Standard in England.

It **will not** make the student industry competent in plumbing and heating installation work but facilitates progression into the occupation by providing potential employers with reliable evidence of a learner’s attainment against the Plumbing and Domestic Heating Technician Apprenticeship Standard.

It is intended to form part of an engaging course of learning for adult learners, and provide occupational entry, so that learners can progress with further learning and training by employment and completion of the apprenticeship standard including the relevant pathway.

Who is this qualification for?

Adults (19+) who wish to pursue a career in the plumbing and domestic heating sector but have not yet secured an apprenticeship.

What does this qualification cover?

This qualification comprises of units, which reflect specific KSBs in the Plumbing and Domestic Heating Technician Apprenticeship Standard.

Please refer to Section 3: Qualification Structure for the units included in this qualification.

## 2.1 Support for this Qualification

This qualification:

* Is regulated at Level 3
* Is supported by employers from the plumbing and heating sector
* Forms part of a recognised route to help adults into employment in the industry

## 2.2 Progression Opportunities

Learners who complete this qualification will be able to demonstrate to potential employers their commitment and achievement against the knowledge, skills, and behaviours in the Plumbing and Domestic Heating Technician Apprenticeship Standard, thus enhancing employability prospects. This will also enable learners to progress to the recognised sector apprenticeship, and work toward becoming an industry recognised plumber or domestic heating engineer. Learners can further progress to undertake qualifications such as:

* EAL Level 3 Diploma in Plumbing and Domestic Heating

Further information 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

## 2.3 Qualification Support Materials

The following materials are available for these qualifications:

* **Assessor Pack**: which contains all relevant assessor guidance relating to the delivery and assessment and marking schemes for the holistically assessed practical assessments and design assignment
* **Learner Assessment Pack:** which contains the holistically assessed practical assessments and design assignment, assessment checklists and all associated guidance for learners
* **\*Practice Examination:** for the externally set and marked on-screen examination

**\***The practice examinations are available to schedule online as per externally set and marked examinations.

All materials can be accessed by EAL registered Centres from the EAL Website [www.eal.org.uk](http://www.eal.org.uk)

## 2.4 Achievement of the Qualification

This qualification is gained when all the necessary units have been achieved. The Centre will then be able to apply for the learner’s Certificate.

# Qualification Structure

## 3.1 Rule of Combination

This qualification will be obtained by the learner once they have successfully completed the **SIX** mandatory units.

This qualification has 540 guided learning hours GL(H) and a 600 hour Total Qualification Time (TQT).

### Mandatory Units:

|  |  |  |  |
| --- | --- | --- | --- |
| **EAL Code** | **Unit Title** | **GL(Hrs)** | **Ofqual Code** |
| TOEPH3-01 | Health and Safety | 35 | D/651/0952 |
| TOEPH3-02 | Scientific Principles | 40 | F/651/0953 |
| TOEPH3-03 | Planning and Supervision | 20 | H/651/0954 |
| TOEPH3-04 | Core Plumbing Systems | 385 | J/651/0955 |
| TOEPH3-05 | Size and Select Plumbing and Domestic Central Heating Systems | 30 | K/651/0956 |
| TOEPH3-06 | Electrical Work and the Control of Plumbing and Domestic Central Heating Systems | 30 | L/651/0957 |

# Centre and Qualification Approval

Centres wishing to run the qualifications will need to comply with the Qualification Manual and EAL’s Centre recognition criteria for these qualifications upon accreditation and launch. Centres must also put in place the appropriate physical and human resources and administration systems to effectively run the qualifications. Please refer to Section 5 for the requirements of Centre staff involved in the delivery of the qualifications.

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

* To add these qualifications to your Centre qualification remit, create and complete a qualification approval application form in Smarter Touch and submit to EAL

**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:

EAL Customer Experience

Tel: +44 (0)1923 652 400

Email: Customer.Experience@eal.org.uk

# Profiles and Requirements

## 5.1 Staff Responsible for Registering and Certification of Learners

Centres are required to appoint a suitable member of staff who can take responsibility for registering learners onto qualifications, submitting entries for assessments to EAL, and taking receipt of external assessment procedures (if appropriate). They may also be responsible for applying to EAL for learner certificates. The role may be undertaken by the same person who undertakes quality assurance.

## 5.2 Teaching Staff

Tutors / trainers involved with the delivery of the units must demonstrate an understanding of the topics/technical content in this qualification. As a minimum they must have achieved a relevant technical qualification to at least Level 3 which covers the key topics in this qualification.

Teaching staff **must** have knowledge and understanding of:

* The qualification structure and content
* The learning outcomes and assessment criteria they are delivering

It is a **recommendation** that teaching staff will:

* Have two years’ experience in teaching / training

  **or**

* Be working towards an appropriate teaching / training qualification

 **or**

* Hold an appropriate teaching / training qualification (e.g., Cert Ed or Learning and Development trainer units)

## 5.3 Learners

There are no formal academic entry requirements for the qualification; however, Centres should ensure that learners have the potential to achieve the qualification. Learners must have the minimum levels of literacy and numeracy to complete the learning outcomes and assessments.

Centres should make learners with particular requirements aware of the content of the qualification and they should be given every opportunity to successfully complete the qualification. EAL will consider any reasonable suggestions for, and from, those with disabilities that would help them to achieve the learning outcomes without compromising the standards required.

Age Restrictions

Learners must be at least 19 years old.

## 5.4 Assessors

The Centre MUST provide EAL with the names of any tutors, trainers or other individuals who will undertake internal assessment, so that these can be approved prior to them carrying out an assessment role.

Internal assessors **must:**

* Have knowledge and understanding of the assessment criteria they are assessing
* Have knowledge and understanding of the qualification structure, content and assessment components
* Understand the assessment process

It is a **recommendation** that assessor’s will**:**

* Have a minimum of two years’ experience in assessment (e.g. within an N/SVQ or teaching / training environment)

  **or**

* Be working towards an appropriate assessment qualification, such as the ‘Level 3 Award in Assessing Vocationally Related Achievement’

 **or**

* Hold an appropriate assessment qualification (as above)

Assessor continuing professional development

It is the responsibility of each assessor to identify and make use of opportunities for Continuing Professional Development (CPD), such as industry conferences, access to trade journals, 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.

## 5.5 Markers: Technically Competent

Where Centre-based assessments are marked by a person who does not come into the assessor category, the marker must have auditable technical competence in the subject. As an example, for a scientific based assessment the person may have auditable competency in that subject area but not necessarily plumbing and domestic heating.

## 5.6 Internal Quality Assurers

This relates to staff undertaking internal verification/moderation of assessment. The Centre MUST provide EAL with the names of any tutor, trainers or other individuals who will undertake internal quality assurance, so that these can be approved prior to them carrying out this role.

The main focus of internal quality assurance for this qualification is:

* The quality assurance of assessment procedures, including standardisation of assessment practice across different assessors within the Centre
* Internal standardisation of marking and moderation of learner grade awarded

Internal quality assurance staff **must**:

* Be familiar with the occupation(s) covered by the qualification
* Have knowledge and understanding of the qualification structure and content
* Understand the assessment process and the role of quality assurance

It is a **recommendation** that the quality assurance staff will:

* Have experience in quality management / internal verification

 **or**

* Hold an appropriate qualification, such as the ‘Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practice, or the ‘Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice’

Continuing professional development of internal quality assurance staff

It is the responsibility of each internal quality assurance staff member 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.

## 5.7 Staff Invigilating On-screen Examinations

Members of staff with responsibility for invigilating on-screen examinations must know, understand, and comply with the Procedures for Conducting the Exam Component within EAL Qualifications’ (EAF 1), which are published by EAL. These members of staff must also:

* Have experience in conducting and controlling examination sessions

 **or**

* Be supervised by an individual experienced in conducting and controlling examination sessions

Note: A tutor / trainer who has prepared the learners for the subject of the examination must not be the sole supervisor at any time during an examination for that subject(s).

# Assessment

The following table indicates the assessment components that are included in the qualification and for each component:

* Who is responsible for setting and marking the component
* How the component is quality assured

|  |  |  |  |
| --- | --- | --- | --- |
| **Assessment component** | **Set by** | **Marked by** | **Method of quality assurance** |
| **Internal** | **External** |
| On-screen examination1  | EAL | EAL | Examination invigilation | Verification and continuous monitoring via EQA visits |
| Centre marked Holistic assessment (practical/ design assignment2) | EAL | Centre | On-going standardisation within the Centre(Including moderation) | Verification and continuous monitoring via EQA visits |

1 Refer to Section 6.1 External Assessments (On-screen Examination).

2 Refer to Section 6.2 Internal Holistic Assessments (EAL Set and Centre Marked).

The learner must pass ALL assessments to achieve the qualification.

A breakdown showing the assessment requirements for each unit is shown below:

|  |  |  |  |
| --- | --- | --- | --- |
| **EAL Code** | **Unit Title** | **On-screen Examination** | **Centre Marked Practical/Theory Assessment** |
| TOEPH3-02 | Scientific Principles | MCQ examination | No |
| TOEPH3-01 | Health and Safety | Holistic Assessment (Practical) |
| TOEPH3-03 | Planning and Supervision |
| TOEPH3-04 | Core Plumbing Systems |
| TOEPH3-06 | Electrical Work and the Control of Plumbing and Domestic Central Heating Systems |
| TOEPH3-05 | Size and Select Plumbing and Domestic Central Heating Systems | No | Holistic Assessment (Design Assignment) |

## 6.1 External Assessments (On-screen Examination)

A specification for the examination, indicating the number of questions to be set for each learning outcome, is provided in Appendix 1.

Key Points

* Arrangements must be made for learners to complete the external assessment between 1st of April and the 30th April
* The examination must be undertaken by the learner under controlled examination conditions, in accordance with EAL’s Procedures for Conducting the Examination Component within EAL Qualifications’ (EAF 1)
* The EAL co-ordinator within the Centre will assume responsibility for liaison and correspondence regarding the external assessment component
* Centres will be sampled, and audits will be carried out by EAL to ensure examinations are delivered in accordance with EAL published procedures
* EAL will release examination results at the end of the third week in May

Assessment objectives are used to set the level of thinking skills being assessed within the level 3 context, including knowledge, understanding and application of knowledge and understanding. Our approach to assessment objectives is designed to complement the purpose of the qualification and align with the occupational levels’ guidance provided by the regulator.

Each unit within the setting specification (Appendix 1) has a set number of questions. Across the questions, there is a question writing requirement to meet a defined coverage of each assessment objective so that the following assessment objective profile is met across the full range of assessment questions, as shown in the table below:

|  |  |
| --- | --- |
| **Assessment Objective**  | **MCQ Coverage**  |
| AO1 Knowledge of the principles, processes and procedures | 25%  |
| AO 2 Understanding of the principles, processes and procedures | 50%  |
| AO3 Application of understanding of the principles, processes and procedures | 25% |

Resittng external assessments (on-screen examination)

Learners who fail to achieve a pass will be permitted to resit this examination after feedback and appropriate tuition have taken place in the specific areas they failed to achieve.

The learner will be allowed a maximum of two resit opportunities (three attempts in total). Learners who fail to achieve after three attempts, will be required to re-register on the qualification.

The resits for externally set and marked examinations will be subject to the current published charges.

Resit scheduling

Learners will be permitted to resit within the following arrangements:

Resit 1:

* EAL will open the window for the first resit scheduling opportunity during the last week of May
* Arrangements must be made for learners to complete the external assessment between 1st and the 14th of June.

Resit 2:

* EAL will open the window for the second resit scheduling opportunity during the last week of June

Arrangements must be made for learners to complete the external assessment between 1st and the 14th of July.

Practice examination

In January of academic year 1 (following the launch of the qualification), EAL will make available an onscreen practice exam. This can be accessed via EAL’s Surpass Exam System. The practice exam is not part of the formal assessment arrangements and will therefore NOT count towards the qualification.

## 6.2 Internal Holistic Assessments (EAL Set and Centre Marked)

Internal holistic assessment both knowledge and practical are a form of controlled internal assessment marked by the Centre. General information regarding conducting controlled internal assessment can be found in the document ‘EAL Guidance for Controlled Internal Assessment marked by the Centre’ with specific guidance referenced from or contained within this qualification specification.

Internal holistic assessment includes the practical assessments and design assignment. These assessments are set by EAL and marked by members of the delivery team at the Centre (see profiles of markers in Section 5). All assessment decisions are then subject to internal standardisation and external quality assurance.

Holistic assessments involve collecting and evaluating evidence that demonstrates achievement of the learning outcomes / criteria. They are accompanied by marking criteria and other materials to ensure that the markers are consistent in their approach to assessment across learners.

Centres are responsible for ensuring that Centre marked holistic assessments are suitably controlled to ensure that assessment decisions are valid and reliable, and that work submitted for assessment by learners is prepared and produced by them independently, without assistance from others, and free of plagiarism.

Specific Guidance - Controlled internal assessment marked by the Centre

Assessor packs

Assessor packs contain relevant information for Centre staff to use as reference/guidance. These documents must not be shared with the learner as they may contain confidential information for Centre staff only.

Learner assessment packs

Learner assessment packs contain instructions relating to the practical assessment and design assignment. Learners will require access to these documents when they are ready to be assessed. Assessors should issue the learner assessment packs to the learner, together with any Centre devised practical assessment task or tasks which have been developed based on the assessment specification provided by EAL. These documents must be controlled by the assessor and provided to the learner as and when required but not retained by the learner. All assessment documentation must be retained by the assessor and/ or internal quality assurer within the controlled environment, unless where otherwise specified. Learners must be appropriately supervised when undertaking the practical assessment and design assignment. The level of supervision must be sufficient to safeguard the learners’ health and safety, and ensure the evidence generated is attributable to the learner.

Electronic systems and records

Interactive word-based versions of the learner assessment pack and design assignments are available through on-line publications. Where an electronic system is used to administer the electronic versions of the learner assessment pack and /or design assignment, the system used **must** operate with the necessary controls in the same manner as that described under ‘Learner assessment packs and knowledge assessment’ i.e., no assessment documentation should be left with the learners to have uncontrolled access etc. Any electronic system that is used **must** prevent the unauthorised sharing of assessment documentation by learners i.e., via email etc. Where electronic systems with the necessary controls are used, evidence such as learner reports and completed design assignment answers may be uploaded or embedded within the system.

E-portfolio systems are generally NOT considered appropriate for delivering/administering internal assessments electronically. E-portfolio systems may be used to track learner attainment, record assessment outcomes and feedback. The following elements from the assessor and learner assessment packs may be replicated/uploaded to an e-portfolio system:

* Assessor pack: learning outcomes, assessment criteria, assessment specification to include the assessment criteria.
* Learner assessment pack: record of achievement for the knowledge assessment, assessment specification to include the assessment criteria, assessment checklist for the practical assessment and assessment feedback.

It is the responsibility of the internal quality assurer (IQA) for the qualification in advance to verifier the electronic system’s functionality and to agree the systems capabilities with regards to the control of qualification documentation before first use and to quality assure what has been uploaded/embedded is accurate and fit for purpose.

In relation to this qualification, evidence should generally not be uploaded to an e-portfolio system without the necessary controls but may reference to what the evidence is, and where this is located. Where electronic or e-portfolio systems are used, the system must be capable of capturing auditable electronic declarations of authenticity, learner and assessor sign off or the electronic equivalent.

About the holistic assessment

Learners are required to complete the holistic assessment for this qualification between the 01st of April and the 30th of June.

The holistic assessment will be set by EAL and comprises of work-related scenarios.

The holistic assessment will be designed to cover a range of assessment criteria from several units that are relevant to the scenario and related tasks.

The holistic assessment will ensure that all relevant learning outcomes within the qualification have been appropriately covered.

The instructions provided with the holistic assessment will specify the time allowed to complete the tasks, the type of evidence that is expected, and other requirements, as appropriate.

A detailed Assessment Checklist will be provided by EAL, which must be held securely in accordance with EAL procedures, and adhered to by all assessors who are involved in assessing the holistic assessment.

Delivery of the holistic assessment will be subject to rigorous internal standardisation (including moderation).

Planning and conducting the Holistic Assessment

Scheduling the holistic assessment

Arrangements must be made for learners to complete the holistic assessment between the 01st of April and the 30th of June. Centres may determine the precise timing of the holistic assessment to suit local needs.

Time allowed

The time (number of hours) in which the holistic assessment must be completed will be specified in the instructions that accompany it from EAL. The ‘actual’ number of hours spent on the holistic assessment and the period over which it is completed must be logged by the learner and verified by Centre staff.

Setting a deadline for completing the holistic assessment

The Centre must specify a due date when learners must complete the holistic assessment. The due date must fall within the designated period (see above) and be communicated clearly to learners. In setting the due date, consideration should be given to ensuring that:

* Learners have a realistic period of time in which to complete the holistic assessment, taking into consideration the specified number of hours and any possible limitations on access to equipment, materials, etc
* Sufficient time will be available for marking, moderation and external verification after the due date has passed
* Contingency arrangements need to be made in the event of learner absence and in extreme cases centres are advised to make a request for special consideration and/or reasonable adjustment.

Resources

Access to resources should be limited to those that are appropriate to the tasks to be completed as part of the holistic assessment, taking account of any requirement for learners to select appropriate tools and materials, if this is specified in the assessment criteria.

The nature of the holistic practical assessment is “open book”. This dictates that access to the internet may be a requirement but will be appropriately restricted in order for learners to access (e.g.) programming manuals, maintenance manuals, relevant formulas, etc. Centres will need to ensure access to unauthorised electronic or wi-fi enabled devices, such as laptops, mobile phones, mobile watches, etc. is restricted. This is to ensure confidentiality of all assessments. EAL recommends that all learner’s unauthorised electronic devices and wi-fi enabled devices, such as mobile phones/watches, are collected by the supervisor at the start of each session.

Learners should be provided with the flexibility to be able to move in the allocated workshop space from one station to another.

Supervision

Learners are not required to be directly supervised under high control conditions with invigilators and high-profile codes of conduct rules on display for learners to adhere to. However, there needs to be sufficient levels of supervision to enable the learner's work to be authenticated (e.g. by delivery staff). This measure will ensure that the progress of the response, at each stage of the development, to the assessment task the learner submits is their own.

The assessor will ensure that interactions between learners are kept to a minimum and are solely for the purpose of accessing the required facilities. At no time should learners be discussing information directly or indirectly related to the assessment.

Learner collaboration

Learners must complete and evidence their work individually. Collaboration between learners undertaking any aspect of the holistic assessment should only be allowed where tasks explicitly state that this is acceptable.

Advice and Feedback from Assessors

Assessors may review learners’ work and provide oral and/or written advice at a general level and, subsequently, allow learners to progress with their task. General advice of this nature does not need to be recorded or considered when the work is being assessed.

Assessors should not give any assistance which goes beyond general advice, for example:

* provide detailed specific advice on how to deliver any aspect of what is being assessed in the assessment criteria
* give detailed feedback on production mistakes which limits learners’ opportunities to show initiative themselves
* intervene personally to improve the product outcome

Assessors must not provisionally assess work (e.g. conduct a formative assessment) and then allow the learner to revise it. Failure of centre staff to adhere to this may constitute malpractice.

Completion and submission

Any material evidence and other supporting information submitted by learners for the holistic assessment will be detailed in the Learner Assessment Pack

Late submission

Learners must complete their holistic assessment and hand in all relevant materials to the Centre by the due date. Any request to extend the submission date must be considered in accordance with EAL’s policy for Special Consideration.

Assessment decisions and annotation

Assessors are responsible for making assessment decisions of work, in accordance with the assessment criteria detailed in the relevant specification and guidance documents. Assessor annotation should be used to provide evidence to indicate how and why assessment decisions have been awarded. This will facilitate the standardisation of assessment decisions within the centre and enable the moderator to check that assessment decisions are in line with the assessment criteria.

Grading the holistic assessment

Centre assessors should allocate a grade for the holistic assessment for each learner using the Assessment Checklist provided. No other sources of information should be used to make judgements about the quality and sufficiency of the evidence.

All materials should be retained securely and confidentially by the Centre, in accordance with EAL policy.

Retaking Internal Holistic Assessments

Learners who fail to achieve a pass in any specific area of the holistic assessment/s will be permitted a retake opportunity after feedback and appropriate tuition have taken place.

The learner will be allowed a maximum of two retake opportunities (three attempts in total) for each section within the Assessment Checklist. Learners who fail to achieve after three attempts, will be required to re-register on the qualification.

All assessment documents that pass or refer must be recorded and retained by the Centre and made available on request.

Standardisation of Holistic Assessment

Members of the internal quality assurance team at the Centre should work with tutors / assessors to ensure that the correct procedures relating to the delivery of the holistic assessment are followed and ensure assessment decisions taken by different assessors are consistent, fair and reliable. Key activities will include:

* Meeting with tutor / assessors (individually and collectively) throughout the course to discuss quality assurance and standardisation issues and provide support and guidance where needed
* Observing tutor / assessors and giving them feedback to help improve their assessment technique
* Sampling learner evidence across different learner cohorts to ensure that appropriate standards have been met
* Arranging cross-marking of learner work to compare results and agree benchmarks

In addition, once all learners have undertaken and completed the holistic assessment and marking has been carried out, internal moderation should be undertaken by a nominated member of the quality assurance team. This will involve checking a sample of learner’s work to:

* Ensure that assessors have been consistent in their use of the Assessment Checklist
* Ensure that grades have been allocated fairly and consistently for all learners
* Check the authenticity of learner evidence
* If appropriate, agree changes to grades where anomalies have been detected

Centres/Organisations must have a moderation process in place to ensure that the assessing of internal assessments is both valid and reliable, through which adjustments to results are made and recorded accordingly. This ensures that the assessment process remains current and standards are consistently applied

Internal moderation should be based on a sample of at least 25% of learners who have completed the holistic assessment and cover all assessors who have been involved in grading decisions. The sample should include any borderline cases that have been identified for review by assessors. If there are fewer than 5 learners who have completed the holistic assessment, then all learners’ work should be moderated.

Where inconsistencies or other discrepancies are identified, or where there is a disagreement on the grades allocated for particular learners, the level of sampling should be increased. All supporting records should include the comparison of assessment decisions from a representative sample of assessments including purposely highlighting where adjustments were necessary.

The outcomes from internal moderation of holistic assessment, including any proposed changes to allocated grades, should be recorded and made available to the External Quality Assurer.

Centres must maintain an assessment and feedback record for each learner, which details the evidence evaluated against the outcomes and the feedback given to the learner. The record will form part of the Learner Assessment Pack. These records must be available to the External Quality Assurer.

Centres/Organisations can utilise EAL’s IQA documents to support their moderation activities, which can be obtained through Smarter Touch.

Further guidance on holistic assessment is provided within the Assessor Pack.

# Quality Control of Assessments

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

# Unit Content

## Unit: TOEPH3-01 Health and Safety

### GLH: 35

### Relationship to the Apprenticeship Standard (England)

Maps to Standard Reference ST0303:

* In all of these activities, plumbers and domestic heating engineers must understand and apply health and safety and environmental regulations, guidance notes and relevant codes of practice

### Unit description

This unit will provide learners with an understanding of the relevant health and safety legislation, practices and procedures when installing and maintaining plumbing and domestic heating systems and components.

### Summary of learning outcomes:

1. Know the health and safety legislation that applies to the building services industry
2. Understand hazardous situations working in the building services industry
3. Apply personal protection measures

### Assessment

This unit is assessed by;

* An externally set and marked on-screen MCQ examination, which assesses the knowledge requirements of learning outcomes 1 – 3.
* A holistic assessment (practical) that will cover learning outcomes 3.2 and 3.4.

| **Learning Outcomes****The learner will know and understand:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| 1. **Know the health and safety legislation that applies to the building services industry**

**1. know the health and safety legislation that applies to the building services industry** | 1.1 | **Identify health & safety legislation** in protecting the workforce and members of the public | **Cover:** **Health & safety legislation*** The Health & Safety at Work etc. Act
* Construction (Design & Management) Regulations
* Confined Spaces Regulations
* Control of Asbestos Regulations
* Control of Noise at Work Regulations
* Control of Substances Hazardous to Health (COSHH) Regulations
* Electricity at Work Regulations
* Gas Safety (Installation & Use) Regulations
* Health & Safety (First Aid) Regulations
* Health & Safety (Signs & Signals) Regulations
* Lifting Operations & Lifting Equipment Regulations
* Manual Handling Operations Regulations
* Personal Protective Equipment at Work Regulations
* Provision & Use of Work Equipment Regulations (PUWER)
* Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)
* Work at Height Regulations
 |
| 1.2 | Define responsibilities of members of the **construction team** | Cover:**Construction Team*** Employers (including employer representatives)
* Designers
* Main contractors
* Sub-contractors
* Employees
* Self-employed (labour only)
* Clients (customers)
 |
| 1.3 | Describe the legal status of **health and safety guidance** materials | Cover:**Health and safety guidance*** Approved Codes of Practice & Guidance
* HSE Guidance Notes
* Construction Skills Certification Scheme (CSCS)
 |
| 1.4 | Identify the role of **enforcing authorities** | Cover:**Enforcing authorities** * Health & Safety Executive
* Local Authority
 |
| 1.5 | State the **control measures of inspectors** | **Cover:****Control measures of inspectors*** Improvement notice
* Prohibition notice
* Powers of prosecution
* Role in providing advice and guidance
 |

| **Learning Outcomes****The learner will know and understand:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| 1. **Understand hazardous situations working in the building services industry**
 | 2.1 | Identify types of site hazards that may be encountered while at **work** or by members of the public | **Cover:****Work:** * Construction sites (all property types)
* In industrial commercial premises (occupied and unoccupied refurbishment)
* In dwellings (occupied and unoccupied refurbishment)
* Vehicle use (driving time limits, driving duress)
 |
| 2.2 | **Define strategies** used to prevent accidents during work activities | **Cover:****Strategies:** * Risk assessments
* Method statements
* Permit to work systems
* Safety notices
* CSCS card
 |
| **2. Understand hazardous situations working in the building services industry**  | 2.3 | State how the hazards of some substances and mixtures can be identified from the **labels** and packaging | **Cover:****Labels:** * Globally Harmonised System (GHS) on the classification and labelling of hazardous substances and mixtures
* Categorisation and hazard classes:
	+ Physical hazards:
		- Explosives
		- Flammable gases
		- Oxidising liquids
		- Corrosive to metals
	+ Health hazards:
		- Acute toxicity
		- Skin corrosion / irritation
		- Eye damage / irritation
		- Respiratory/skin sensitisation
	+ Environmental hazards:
		- Hazardous to the aquatic environment
* presentation of information:
	+ GHS pictogram or signal word (Danger or Warning)
	+ Hazard statement (Causes serious eye damage, Toxic if swallowed, etc.)
	+ Precautionary statement (Wear eye protection, Do not eat, drink or smoke when using this product, etc.)
 |
| **2. Understand hazardous situations working in the building services industry** | 2.4 | Describe how to deal with **hazardous substances** encountered during plumbing and heating activities including disposal where applicable | **Cover:****Hazardous substances:** * Lead – solid and fume
* Solvents and lubricants
* Fluxes
* Jointing compounds
* Sealants
* Gases – lpg, oxy-acetylene, nitrogen and carbon dioxide
* Petroleum
* Diesel fuels
* Cleaning agents
* Corrosion inhibitors
* Disinfectants
* Anti-freeze, glycol mixtures
* Solar fluid (flash to steam).
* Biocides
 |
| 2.5 | Identify **common building materials and services** **components that may contain asbestos** | **Cover:****Common building services components that may contain asbestos:** * Flue, soil, rainwater pipes and gutters
* Tanks and cisterns
* Artex
* Small gaskets and seals
* Bath panels/panelling
* Floor tiles
 |
| **2. Understand hazardous situations working in the building services industry** | 2.6 | Identify types of **asbestos** that may be encountered in the workplace | **Cover:****Types of asbestos:** * White (Chrysotile)
* Brown or grey (Amosite)
* Blue (Crocidolite)
* Asbestos cement-based materials
 |
| 2.7 | State **procedures** that must be used to safely work with asbestos cement based materials | **Cover:****Procedures:** * Work activities for licensed and unlicensed work
* Licensing requirements for asbestos removal organisations
* Safe disposal requirements
* Protection of the workforce and members of the public
 |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **3. Apply personal protection measures** | 3.1 | State the purpose of **personal protective equipment (PPE)** | **Cover:****Personal protective equipment (PPE)*** Clothing protection including high visibility.
* Eye protection
* Hand protection
* Head protection
* Foot protection
* Hearing protection
* Respiratory protection (Including fit tests)
* Vibration protection
* Harnesses
 |
| 3.2 | Use of **personal protective equipment (PPE)** |
| 3.3 | Carryout manual handling **procedures** | **Cover:****Procedures** * Assessment of a safe load
* Safe kinetic lifting technique
 |
| 3.4 | Use **Mechanical lifting aids** | **Cover:****Mechanical lifting aids*** Sack trolley
* Pallet truck
* Hoists
 |

## Unit: TOEPH3-02 Scientific Principles

### GLH: **40**

### Relationship to the Apprenticeship Standard (England)

Maps to Standard Reference ST0303:

### Unit description

This unit is designed to enable learners to understand the essential scientific principles that underpin the installation, commissioning and maintenance requirements of systems and components in the Mechanical Services Industry.

The unit also provides learning in a range of basic calculations.

Summary of learning outcomes:

1. Understand the units of measurement used in the plumbing and domestic heating systems industry
2. Understand the properties of materials
3. Understand the principles of force and pressure and their application in the plumbing and domestic heating industry
4. Understand the mechanical principles in the plumbing and domestic heating systems industry

### Assessment

This unit is assessed by:

* An externally set and marked on-screen MCQ examination, which assesses the knowledge requirements of learning outcomes 1 – 4.

|  |  |  |
| --- | --- | --- |
| **Learning Outcomes****The learner will know and understand:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| **1 Understand the units of measurement used in the plumbing and domestic heating systems industry** | 1.1 | Identify internationally recognised (SI) **units of measurement** | **Cover:****Units of measurement*** Metre (length) m
* Kilogram (mass) kg
* Second (time) s
* Kelvin (temperature)
* Pascals
* Bar
 |
| 1.2 | State the application and use of **SI derived units** | **Cover:****SI derived units*** Area (m2)
* Volume (m3)
* Litres (L)
* Density (kg/m3)
* Velocity (m/s)
 |
| 1.3 | Describe the use of conversion tables for non-SI units |  |

| **Learning Outcomes****The learner will know and understand:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **2 Understand the properties of materials** | 2.1 | **Compare relative densities** of common materials | **Cover:****Relative densities*** Relative density to air
* Relative density to water
 |
| 2.2 | Identify properties and applications of **solid materials** | **Cover:****Solid materials** * Pure metals
* Ferrous metals
* Alloys including solders
* Thermo plastics
* Thermo-setting plastics
* Fireclays / ceramics
 |
| 2.3 | Identify **properties of water** | **Cover:****Properties of water*** Boiling / freezing point
* Change of state and molecular changes
* Volume and pressure increase
* Density at differing temperatures
* To steam / super-heated steam
* Capillarity
* Acidity/alkalinity (pH value)
* Water hardness:
	+ Soft
	+ Temporary hard
	+ Permanently hard
 |
| **2 Understand the properties of materials** | 2.4 | Identify **properties of gases**  | **Cover:****Properties of Gasses*** Refrigerant Gas, LPG and air
	+ Pressure
	+ Volume
	+ Temperature of gases found within the industry
	+ Charles’s law
	+ Boyle’s law
 |

| **Learning Outcomes****The learner will know and understand:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **3. Understand the principles of force and pressure and their application in the plumbing and domestic heating industry** | 3.1 | State **how units of force and pressure** are derived from SI units | **Cover:****Units of force and pressure*** Acceleration (m/s2)
* Force due to gravity
* Force - Newton (N)
* Pressure (N/m2)
* Atmospheric pressure
* Flow rate (m3/s)
 |
| 3.2 | Identify **pressure and flow** rate units of measurement  | **Cover:****Pressure and flow*** Pressure
	+ Bar / millibar
	+ kPa
	+ Psi
	+ Metre head
* Flow rate
	+ m3/s
	+ l/s
	+ kg/s
 |
| 3.3 | Describe the application of pressure and flow rate measurement |  |
| **3. Understand the principles of force and pressure and their application in the plumbing and domestic heating industry** | 3.4 | Carry out simple **force and pressure** calculations | **Cover:****Force and pressure*** Force calculations
	+ Pressure head
* Pressure calculations
	+ Static pressure
	+ Dynamic pressure
	+ Draught
	+ Forced draught
 |
| 3.5 | Explain the relationship between **velocity, pressure and flow rate** in systems | **Cover:****Velocity, pressure and flow rate*** Effects of increasing / reducing pressure
* Effects of increasing / reducing pipe size
 |
| 3.6 | Identify how **restrictions** in the pipework affects the flow of liquids and gases | **Cover:****Restrictions*** Changes of direction, bends and tees
* Pipe size
* Pipe reductions
* Roughness of material surface
* Constrictions such as valves
 |
| 3.7 | Describe the principles of a siphon |  |

|  |  |  |
| --- | --- | --- |
| **Learning Outcomes****The learner will know and understand:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| **4 Understand the mechanical principles in the plumbing and domestic heating systems industry** | 4.1 | Outline principles of **machines** | **Cover:****Machines*** Levers
* Pulleys
* Archimedes screws
 |
| 4.2 | Outline principles of **mechanics** | **Cover:****Mechanics*** Theory of moments
* Action and reaction
* Centre of gravity
* Equilibrium
* Velocity and ratio
* Mechanical advantage
 |

## Unit: TOEPH3-03 Planning and Supervision

### GLH: **20**

### Relationship to the Apprenticeship Standard (England)

Maps to Standard Reference ST0303:

### Unit description

This unit enables the learner to develop the essential skills required to communicate with others and an understanding of risk assessments, method statements and workplans.

Summary of learning outcomes:

1. Know how to communicate with others
2. Producing risk assessments and method statements for the plumbing and domestic heating systems industry
3. Producing a work programme for tasks in the plumbing and domestic heating systems industry

### Assessment

This unit is assessed by:

* An externally set and marked on-screen MCQ examination, which assesses the knowledge requirements of learning outcomes 1.1 – 1.4.
* A holistic assessment (practical) that will cover learning outcomes 2 and 3.

|  |  |  |
| --- | --- | --- |
| **Learning Outcomes****The learner will know and understand:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| **1. Know how to communicate with others** | 1.1 | Identify methods for effective communication with **individual’s needs** | **Cover:****Individual’s needs*** Disabilities
* Learning difficulties
* Language differences
	+ Dialects
	+ Accents
	+ English spoken as a second language
 |
| 1.2 | Identify suitable **communication methods** | **Cover:****Communication methods*** Oral communication
	+ In person
	+ Online
	+ Telephone
* Written communication
	+ E-mail
	+ Fax
	+ Letter
	+ Text messaging
	+ Social media
 |
| 1.3 | Identify **appropriate actions** to deal with conflicting parties | **Cover:****Appropriate actions*** Mediation
* Negotiating
* Compromising
* Escalation
 |
| 1.4 | Explain the effects of poor communication. |  |

|  |  |  |
| --- | --- | --- |
| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| **2. Producing risk assessments and method statements for the plumbing and domestic heating systems industry** | 2.1 | Identify different hazards |  |
| 2.2 | State levels of risk |  |
| 2.3 | Produce a risk assessment for a task |  |
| 2.4 | Produce a method statement for a task |  |

|  |  |  |
| --- | --- | --- |
| **Learning Outcomes****The learner will know and demonstrate** | **Assessment Criteria****The learner can:** | **Coverage**  |
| **3. Producing a work programme for tasks in the plumbing and domestic heating systems industry** | 3.1 | Identify types of **projects** | **Cover:****Projects*** Private installation work
* Private service / maintenance work
* New-build installation contract work
* Service / maintenance contract work
 |
| 3.2 | Explain **factors** to consider when planning activities to job specifications | **Cover:****Factors*** The scope, purpose and requirements of the work
* Identification of work responsibilities
* External factors that affect timeframe
 |
| 3.3 | Describe the impact when materials are not delivered on time against the **work programme** | **Cover:****Work programme*** Work in private properties
* Work on new-build housing
* Work on commercial contracts
* Avoiding loss of materials on site (theft)
 |
| 3.4 | Identify factors which affect working **time allocation** to work activities | **Cover:****Time allocation*** Labour resources
* Planning work with other trades
* Material deliveries
 |
| 3.5 | Produce **simple work programmes** | **Cover:****Simple work programmes*** Simple bar (progress) charts
 |

## Unit: TOEPH3-04 Core plumbing systems

### GLH: **385**

### Relationship to the Apprenticeship Standard (England)

Maps to Standard Reference ST0303:

### Unit description

This unit is designed to enable learners to understand the installation, decommissioning and soundness testing of a basic range of plumbing and domestic heating systems in dwellings and industrial / commercial properties (of similar size and scope to domestic dwellings). It then moves on to providing learning in the maintenance and commissioning of a complex range of plumbing and domestic heating systems in dwellings, including those in multi-storey properties and single occupancy dwellings fed by private water supplies. The unit covers compliance with the requirements of the Water Supply (Water Fittings) Regulations and Building Regulations applicable to this type of system.

Summary of learning outcomes:

1. Understand Plumbing and Domestic Central Heating Systems
2. Decommission plumbing and domestic central heating systems
3. Perform a soundness test of plumbing and domestic central heating systems and components
4. Commission and handover plumbing and domestic heating systems and components
5. Perform fault diagnosis and rectification on plumbing and domestic heating system components
6. Carry out service and maintenance on plumbing and domestic heating system components and pipework

### Assessment

This unit is assessed by;

* An externally set and marked on-screen MCQ examination, which assesses the knowledge requirements of learning outcomes 1.1 – 1.12, 3.2, 3 - 3.5, 4.1- 4.3, 5.1, 5.2
* A holistic assessment (practical) that will cover learning outcomes 1.1 – 1.7 and 1.13, 2.1, 3.1-3.6, 4.1 - 4.4, 5.1-5.3, 6.1-6.5

| **Learning Outcomes****The learner will know and understand:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems** | 1.1 | Identify **fluid categories** of water and uses of water supplied to dwellings | **Cover:****Fluid categories*** 1 to 5
 |
| 1.21.21.21.21.21.21.21.2 | Describe working principles of **plumbing and domestic heating systems**, positioning fixing, connection and operation of **components**Describe working principles of **plumbing and domestic heating systems**, positioning fixing, connection and operation of **components** (continued)Describe working principles of **plumbing and domestic heating systems**, positioning fixing, connection and operation of **components** (continued)Describe working principles of **plumbing and domestic heating systems**, positioning fixing, connection and operation of **components** (continued)Describe working principles of **plumbing and domestic heating systems**, positioning fixing, connection and operation of **components** (continued)Describe working principles of **plumbing and domestic heating systems**, positioning fixing, connection and operation of **components** (continued)Describe working principles of **plumbing and domestic heating systems**, positioning fixing, connection and operation of **components** (continued)Describe working principles of **plumbing and domestic heating systems**, positioning fixing, connection and operation of **components** (continued) | **Cover:****Plumbing and domestic heating systems**Cold water systems* Potable cold water supplies (wholesome)
	+ - Direct cold water systems (Mains and Private supplies)
		- Indirect cold water systems (Mains and Private supplies)
* Non-potable cold water supplies (unwholesome)
	+ Rainwater harvesting and greywater reuse

Hot water systems* Vented
* Unvented

Domestic central heating systems* Sealed Systems
	+ System boiler
	+ Combination boiler
	+ Heat only boiler (with external expansion vessel)
* Open Vented Systems
	+ Heat only boiler

Sanitary appliances and pipework systems* Primary ventilated stack system
* Secondary ventilated stack system
* Ventilated branch discharge system
* Stub stack system

Rainwater systems* Pipe (RWP)
	+ Round section
	+ Square section
* Gutter
	+ Half round
	+ Square
	+ Ogee
	+ High capacity

**Components****Cold water systems*** Water meters
* Water treatment
	+ Water softeners
	+ Water filters
	+ Water conditioners
* Cisterns
	+ Cold water storage cisterns ((less than 1000l)
	+ Cold water feed cisterns
	+ Combined feed and expansion cisterns
	+ WC / urinal flushing cisterns
	+ Break cisterns
* Boosted system components
	+ Float switch
	+ Pressure switch
	+ Accumulator / pressure vessel
	+ Booster pump sets
	+ pressure relief valve
	+ pressure gauge
* Rainwater harvesting, greywater reuse
	+ Anti-surcharge valve
	+ Calmed inlet
	+ Inlet filter
	+ Level sensor / float switch
	+ Unit (including pump and air gap)
	+ Pump control unit
	+ System control unit
	+ Expansion vessel (direct systems)
	+ Water level gauge
	+ Solenoid controlled type AA air gap back-up supply
	+ Floating extraction point
	+ Storage tanks

**Hot water systems*** Cylinders (vented and unvented)
	+ Various grades available
	+ Sizes available
	+ Direct
	+ Indirect
		- Single feed, self-venting
		- Double feed
		- Quick recovery
		- Dual coil
		- Combination
	+ Thermal store
* Secondary circulation pump
* Cisterns

**Cold and hot water systems (as applicable to system type)*** Appliances
	+ Baths
	+ WCs
	+ Over the rim bidets
	+ Wash hand basins
	+ Sinks
	+ Urinals
	+ Refrigerators
	+ Washing machines
	+ Dishwashers
* Taps, outlets and valves
	+ Mixer taps
	+ Outside taps
	+ Pillar taps
	+ Bib taps
	+ Bi-flow mixer taps
	+ Ceramic disc taps
	+ Infra-red operated taps
	+ Boiling water taps
	+ Flexible outlet taps
	+ Concussive taps
	+ Flow limiting taps and valves
	+ Stop valves
	+ Spray taps
	+ Servicing valves
	+ Full way gate valves
	+ Spherical plug valves
	+ Thermostatic mixing valve
	+ Drain valves
	+ Non-return valves
	+ Float operated valves (part 1–4)
* Showers
	+ Gravity
	+ Instantaneous electric
	+ Digital shower valves
	+ Bath shower mixer
	+ Pumped (single and twin impeller)
	+ Mixer valve
	+ Negative head
	+ Positive head

**Central heating system*** **Sealed Systems**
	+ Expansion vessel
	+ Pressure gauge
	+ Filling loop
	+ Pressure relief Valve
* **Open Vented Systems**
	+ Feed and expansion cisterns
	+ Air separators
	+ Open Vent and Feed pipe
	+ Automatic air vents
* **Generic**
	+ Radiator valves – thermostatic and manual / Lockshield valves
	+ Circulating pumps
	+ Pump Valves
	+ Thermo-mechanical cylinder control valves
	+ Anti-gravity valves
	+ Drain valves
	+ Additives
		- Inhibitor
		- De-scaler
		- De-sludger
	+ Primary and secondary heating circuits:
		- Low loss headers
		- Low loss headers for multiple boiler installations
		- Multiple heat producing appliance installation
		- Buffer tanks
	+ Expansion joints
	+ Corrosion filters
	+ Controls:
		- Zone valves (2 port, 3 port, mid position and diverter)
		- Programmer
		- Timer
		- Thermostats:
			* Programmable room stat
			* Cylinder stat
			* Frost stat
		- Optimizer
		- Weather compensator
		- Wiring Centre
	+ Automatic by-pass
	+ Heat emitters:
		- Bespoke heat emitters
		- Panel radiators
		- Column radiators
		- Low surface temperature radiators
		- Fan convectors
		- Plinth heaters
		- Towel warmers
	+ Underfloor heating components:
		- Manifolds
		- Pump control unit
		- Insulation
		- Pipework
		- Manifold isolation ball valves
		- Supports
	+ Underfloor heating pipework:
		- Clip rails and staple clips
		- Screed system plates
		- Pocketed polystyrene products
		- Heat emission / transfer plates
		- Floating floor panels
		- Reflective foil insulation
		- Bend supports

**Sanitary appliances and pipework systems*** Bend
	+ Male & Female
	+ 92½º
	+ 135º
	+ access bend
	+ offset bend
* Branch tee
* Socket
* Strap boss
* Socket boss
* Vent terminal
* Waste manifold
* Pan connectors
* Traps
* Waterless trap
* Air admittance valve
* Clips / brackets
* Socket plug
* Socket rodding access
* Floor gullies

**Rainwater systems*** Pipe (RWP)
	+ Offsets
	+ Angles
	+ Branches
	+ Hopper heads
	+ Shoes
	+ Specialist connectors to the drainage system
* Gutter
	+ Running outlets
	+ Gutter angles
	+ Gutter unions
	+ Stop ends
	+ Specialist unions between different gutter materials
	+ Siphonic outlet
 |
| 1.3 | Identify location and function of **unvented system components** | **Cover:****Unvented system components*** Cylinder
* Isolation valve
* Strainer
* Expansion vessel
* Pressure reducing valve
* Expansion (pressure) relief valve
* Temperature relief valve
* Balanced cold connection
* Check valve
* D1, D2 discharge pipework requirements
* Composite valve
* Tundish
* Operating thermostat
* Overheat thermostat
 |
| 1.4 | Describe secondary circulation and how trace heating can be used in hot water systems |  |
| **1 Understand Plumbing and Domestic Central Heating Systems** | 1.5 | Identify **types** and **layout** features of domestic central heating systems | **Cover:****Types*** Pumped heating gravity hot water
* Fully pumped, 2 x two port valves (S plan)
* Fully pumped, 3 x two port valves (S plan+)
* Fully pumped, 3 port valve (mid position / diverting) (Y/W plans)
* Fully Pumped with a low loss header
* Low temperature hot water and lower temperature hot water central heating systems

**Layout*** One pipe
* Two pipe
* Manifold (micro and minibore)
* Underfloor heating
	+ Series and spiral
	+ Timber floor
	+ Solid floor
 |
| 1.6 | Explain the importance of pump positioning in domestic central heating systems |  |
| **1 Understand Plumbing and Domestic Central Heating Systems****1 Understand Plumbing and Domestic Central Heating Systems** | 1.7 | Define zoning and control requirements of central heating systems in accordance with statutory legislation  |  |
| 1.81.8 | Identify different types of **sanitary appliances and layouts** used in dwellingsIdentify different types of **sanitary appliances and layouts** used in dwellings (continued) | **Cover:** **Sanitary appliances*** Conventional WC
* Flushing cisterns (automatic and manual)
* Waste disposal units
* Baths
* Bidets
* Wash hand basins
* Shower tray
* Bath / shower screens and cubicles
* Sinks
* WC macerators
* Waste water lifters / pumps used in domestic dwellings

**Layouts*** Discharge stacks
	+ Soil stack sizes based on WC outlet size
	+ Waste stack sizes serving waste appliances only
	+ Use and types of bends
	+ Proximity of low level connections
* Branch discharge
	+ Layout of unventilated and ventilated branch discharge pipework
	+ Maximum pipework lengths and gradients
	+ Sizes of branch discharge pipework for soil and waste appliances
	+ Use of traps and self-sealing valves
	+ Methods of ventilating branch discharge pipework
	+ Methods of connecting multiple waste appliances to branch discharge pipework
	+ Methods of connecting branch discharge pipework into the main stack
* Stack ventilation
	+ Proximity of vent outlet to openable windows
	+ Use of air admittance valves
* Systems and appliances
	+ Waste appliance connections to gullies
	+ Waste appliance connections direct to drain
	+ WC connection direct to drain
 |
| **1 Understand Plumbing and Domestic Central Heating Systems** | 1.9 | Outline the suitability of **below ground drainage systems** to receive **waste water** | **Cover:****Below ground drainage systems*** Combined drainage systems
* Separate drainage systems
* Partially separate drainage systems
* Soakaway
* Cesspit
* Septic tanks

**Waste water*** Foul
* Waste
* Condensate
 |
| 1.10 | Installation requirements of sanitary facilities and equipment in dwellings for the disabled including wet rooms |  |
| 1.11 | Explain working principles of greywater recycling systems |  |
| **1 Understand Plumbing and Domestic Central Heating Systems** | 1.12 | Explain **backflow** risk and required **methods** of prevention | **Cover:****Backflow*** Back pressure
* Back siphonage

**Methods (as applicable to system type)*** Air gaps
	+ AA
	+ AB
	+ AD
	+ AG
	+ AUK1
	+ AUK2
	+ AUK3
	+ DC
* Mechanical
	+ BA
	+ CA
	+ DB
	+ EA/EB
	+ EC/ED
	+ HA
	+ HUK1
	+ HC
 |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **1 Understand Plumbing and Domestic Central Heating Systems****1 Plumbing and Domestic Central Heating Systems****1 Plumbing and Domestic Central Heating Systems** | 1.131.131.13 | **Install** plumbing and domestic heating systems**Install** plumbing and domestic heating systems (continued)**Install** plumbing and domestic heating systems (continued) | **Cover:****Cold, hot water and sanitary appliances and pipework systems (as applicable to system type)*** Cistern
* Cylinder (open vented)
* Cylinder (unvented)
* Bath
* WHB
* WC
* Booster set
* Shower
* Primary ventilated stack
* Stub stack

**Central heating*** Boiler/jig
* Pump
* Motorised valve
* Expansion vessel
* Radiator
* Radiator valves
* Underfloor heating
* Controls
* Valves

**Rainwater*** Pipe (RWP)
	+ Offsets
	+ Shoes
	+ Clips
* Gutter system
	+ Running outlets
	+ Gutter angles
	+ Gutter unions
	+ Stop ends
	+ Brackets

**Pipework materials** * Copper pipework – hot, cold and central heating
* Plastic pipework – hot, cold, central heating (including underfloor) sanitary and rainwater pipework

**Bends*** Copper
	+ 90o bends
	+ Sets and offset bends
	+ Passover bends
* Plastic/composite (hot, cold and heating)
	+ Cabling technique
	+ Minimum bend radius

**Jointing*** Copper pipe
	+ Solder ring and end feed
	+ Compression (type A)
	+ Push-fit
	+ Press-fit
* Plastic / composite pipe (hot, cold and heating)
	+ Push fit
	+ Compression
	+ Proprietary - copper and MDPE
* Plastic jointing (Sanitary pipework)
	+ Ring seal
	+ Compression
	+ Solvent weld
 |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **2 Decommission plumbing and domestic central heating systems****2 Decommission plumbing and domestic central heating systems** | 2.12.1 | **Decommissioning** of **plumbing and domestic central heating systems** in accordance with appropriate **procedures****Decommissioning** of **plumbing and domestic central heating systems** in accordance with appropriate **procedures** (continued) | **Cover:****Plumbing and domestic central heating systems*** Cold water
* Hot water
* Central heating
* Sanitary appliances and pipework
* Rainwater

**Decommissioning*** Temporary
* Permanent

**Procedures** (as applicable to the **system** type)* Notify relevant person
* Isolate the fuel/electricity supply to the system as appropriate
* Isolate water supply
* Apply warning notices and signs
* Drain system to a suitable location
* Appropriately dispose of contents and any additives
* Continuity bonding as required
* Temporary capping of pipework sections as required
* Notify building users
* Alternative supplies as required
* Alternative source of heat as required
* Sanitary appliances and pipework and rainwater systems (in addition to the above)
	+ Checks for hazardous materials
	+ Appropriate access equipment
	+ Alternative sources of facilities or supplies as required
	+ Removal of components
	+ Appropriately dispose of materials
 |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **3 Perform a soundness test of plumbing and domestic central heating systems and components**  | 3.1 | Identify information sources required to complete testing and commissioning |  |
| 3.2 | Describe how to fill and vent plumbing and domestic central heating **systems** | **Cover:****Systems****Cold water systems*** Wholesome
	+ Direct cold water systems (Mains & Private supplies)
	+ Indirect cold water systems (Mains and Private supplies)
* Unwholesome
	+ Rainwater harvesting and greywater reuse

**Hot water systems** * Vented
* Unvented

**Central Heating** |
| 3.3 | **Describe a visual inspection** of sanitary appliances and pipework systems and a rainwater system to confirm that it is ready to be soundness tested | **Cover:****Visual inspection*** Leakage
* Adequate support
* Damage
* Gutters are clear of debris
 |
| **3 Perform a soundness test of plumbing and domestic central heating systems and components** | 3.4 | **Carry out a soundness test** to industry requirements on **plumbing and domestic central heating pipework** and components | **Cover:****Soundness test** (as applicable to the **system** type)* Visual inspection
* Notify persons testing is to commence
* Initial fill
* Stabilisation
* Test to required pressure
* Wet test (sanitary appliances and pipework systems)
* Check for leaks
* Check pressures after test period
* Complete documentation and notify as required

**Pipework*** Metal pipework
* Plastic pipework

**Plumbing and domestic heating systems**Cold water systems* Wholesome
	+ Direct cold water systems (Mains & Private supplies)
	+ Indirect cold water systems (Mains and Private supplies)
* Unwholesome
	+ Rainwater harvesting and greywater reuse

Hot water systems * Vented
* Unvented

Central heatingSanitary appliances and pipework systemsRainwater systems |
| **3 Perform a soundness test of plumbing and domestic central heating systems and components** | 3.5 | State the **flushing requirements** for new and existing plumbing and domestic central heating **systems** | **Cover:****Systems****Cold water systems*** Wholesome
	+ Direct cold water systems (Mains & Private supplies)
	+ Indirect cold water systems (Mains and Private supplies)
* Unwholesome
	+ Rainwater harvesting and greywater reuse

**Hot water systems** * Vented
* Unvented

**Central Heating****Flushing requirements** (as applicable to the **system** type)* Cold flush
* Hot flush
* Cleansing
 |
| 3.6 | State the use of **system additives** for new and existing central heating systems | **Cover:****System additives*** Neutralisers
* Cleanser
* Descaler
* Inhibitor
 |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **4 Commission and handover plumbing and domestic heating systems and components****4 Commission and handover plumbing and domestic heating systems and components** | 4.1 | Describe **Operational checks** required during commissioning plumbing and domestic heating systems | **Cover:****Operational checks** (as applicable to the cold, hot and central heating system type)* Temperature
* Flow rate
* Pressures
* Operation of components and controls
* Setting/checking water levels
* Hydronic balancing of a central heating system
* Sanitary appliances and pipework
	+ Correct fall
	+ No trap seal loss
	+ No leaks
	+ Adequate support
	+ Waste removed satisfactory
* Rainwater
* Correct fall
* Spill over
* Leaks
 |
| 4.2 | Identify the range of information that would be detailed on commissioning documentation |  |
| 4.3 | State the procedure for handing over to the end user |  |
| 4.4 | Carry out the **commissioning procedure** for **plumbing and domestic heating system** | **Cover:****Plumbing and domestic heating systems**Cold water systems* Wholesome
	+ Direct cold water systems (Mains & Private supplies)
	+ Indirect cold water systems (Mains and Private supplies)
* Unwholesome
	+ Rainwater harvesting and greywater reuse

Hot water systems * Vented
* Unvented

Central heatingSanitary appliances and pipework systemsRainwater systems**Commissioning procedure** (as applicable to the **system** type)* Visual inspection
* Confirm the provision of appropriate marking and labelling to system pipework and components
* Fill and vent
* Soundness test
* Flush
* Operational checks
* Water quality checks where required
* Balance central heating system
* Commissioning documentation
* Handover procedure
 |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **5 Perform fault diagnosis and rectification on plumbing and domestic heating system components****5 Perform fault diagnosis and rectification on plumbing and domestic heating system components****5 Perform fault diagnosis and rectification on plumbing and domestic heating system components****5 Perform fault diagnosis and rectification on plumbing and domestic heating system components****5 Perform fault diagnosis and rectification on plumbing and domestic heating system components** | 5.1 | Describe methods of diagnosing system faults | **Cover:****System** * Cold water
* Direct cold water systems (Mains & Private supplies)
* Indirect cold water systems (Mains and Private supplies)
* Rainwater harvesting and greywater reuse
* Hot water
* Central heating
* Sanitary appliances and pipework
* Rainwater

**Diagnosing – as appropriate to system type*** End user
* Manufacturer instruction
* Fault diagnosis flow chart
* Service history
* Visual inspection
 |
| 5.25.25.2 | Carry out diagnostic checks for a range of **faults**Carry out diagnostic checks for a range of **faults** (continued)Carry out diagnostic checks for a range of **faults** (continued) | **Cover:****Faults****Cold water*** Incorrect pressures
* Accumulator / expansion vessel failure
* Blockages
* System debris
* Pump failure
* Control failure
* Pressure relief valve failure
* Incorrect support to system pipework and storage cisterns
* Excessive noise in pipework systems
* Cistern failure
* Leakage from below ground cold water service pipework
* Leakage or ineffective operation of
	+ terminal fittings
	+ float operated valves
	+ stop and service valves

**Hot water*** Incorrect pressures
* Blockages
* System debris
* Stratification of cylinders
* Incorrect support to hot water system pipework and storage cisterns
* Excessive noise in pipework systems
* Hot water storage cylinder / heater failure
* Leakage or ineffective operation of
	+ Terminal fittings
	+ Float operated valves
	+ Stop and service valves
	+ Mixer showers
	+ Thermostatic mixing valves
* Component failure
	+ Motorised valves not operating
* Heat exchanger
* Thermostat
* Programmer
* Expansion valve
* Pressure relief valve
* Underfloor manifold and pump station
* Cistern
* Pump

**Central heating*** Pumping over
* Persistent venting
* Emitter cold spots
* Incorrect pressures
* Blockages
* Incorrect support to system pipework and components
* Excessive noise in pipework systems
* Leakage or ineffective operation of:
	+ terminal fittings
	+ stop and service valves
	+ pipework
* Component failure
	+ Stuck TRVs
	+ Motorised valves not operating
	+ Heat exchanger
	+ Thermostat
	+ Programmer
	+ Pressure relief valve
	+ Underfloor manifold and pump station
	+ Feed and expansion cistern
	+ Expansion vessel
	+ Pump

**Sanitary appliances*** Leaks
* Blockages
* Inadequate or broken support
* Trap seal loss
* Debris
* Lack of provision for expansion and contraction
* Component failure
	+ Cistern / tank faults
	+ Appliance faults
	+ WC macerators
	+ Waste water lifters/pumps
	+ Sink waste disposal units
	+ Air admittance valves
	+ Pipework
	+ Condensing boiler condensate

**Rainwater*** Leaks
* Blockages / debris
* Inadequate or broken support
* Broken gutter / pipe (RWP)
* Incomplete systems
* Incorrect fall
* Lack of provision for expansion and contraction
 |
| 5.3 | Carry out repair and rectification **procedures** to deal with a range of faults | **Cover:****Procedure*** Diagnose
* Notify client
* Safely isolate
* Decommission
* Rectify
* Re-commission
* Handover
 |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| 1. **Carry out service and maintenance on plumbing and domestic heating system** **components and pipework**
2. **Carry out service and maintenance on plumbing and domestic heating system** **components and pipework**

**6. Carry out service and maintenance on plumbing and domestic heating system** **components and pipework** | 6.1 | Identify how to use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components |  |
| 6.26.26.2 | Describe **routine checks** required on plumbing and domestic heating system components and pipework as part of a periodic maintenance programmeDescribe **routine checks** required on plumbing and domestic heating system components and pipework as part of a periodic maintenance programme (continued)Describe **routine checks** required on plumbing and domestic heating system components and pipework as part of a periodic maintenance programme (continued) | **Cover:****Routine checks – cold water*** Visual inspection of pipework for correct labelling, leakage and adequate support
* Effective operation of terminal fittings
* Effective operation of float operated valves
* Effective operation of valves
* Condition of cold water storage cistern
* Condition of storage tanks
* Strainer / filter inspection and cleaning
* Pump operation
* Float and pressure switch operation
* Pressure relief valves
* Water quality checks where required
* Effective backflow protection

**Routine checks – hot water*** Visual inspection of pipework for correct labelling, leakage and adequate support
* Effective operation of terminal fittings
* Effective operation of float operated valves
* Effective operation of service valves
* Condition of hot water cylinder
* Condition of storage cisterns
* Unvented cylinder and controls
* Effective operation of thermostatic control devices
* Temperature and pressure relief valve
* Expansion vessel
* Composite valve
* Pumps

**Routine checks – central heating*** Visual inspection of pipework for leakage, adequate support and insulation
* Effective operation of terminal fittings
* Effective operation of float operated valves
* Effective operation of valves
* Condition of cisterns
* Effective operation of thermostatic control devices
* Temperature and pressure relief valve
* Expansion vessel
* Pumps
* Heat emitter
* Performance checks

**Routine checks – sanitary appliances and pipework*** Visual inspection of pipework for leakage, adequate support
* Effective operation of terminal fittings
* Effective operation of float operated valves
* Effective operation of valves
* Condition of cisterns
* Operation of flushing cisterns / mechanisms
* Fitting of effective waste outlet plugs
* Effective operation of appliance traps / self-sealing valves
* Pumps
* Performance checks
* Appliance support
 |
| 6.3 | Identify types of information to be provided on a maintenance record for **plumbing and domestic heating systems** | **Cover:****Plumbing and domestic heating system components and pipework*** Cold water
* Wholesome
	+ Direct cold water systems (Mains and Private supplies)
	+ Indirect cold water systems (Mains and Private supplies)
* Unwholesome
	+ Rainwater harvesting
	+ Greywater reuse
* Hot water
* Vented
* Unvented
* Central heating
* Sanitary appliances and pipework
 |
| 6.4 | Identify requirements for legionella and bacterial growth control measures |  |
| **6. Carry out service and maintenance on plumbing and domestic heating system** **components and pipework** | 6.5 | Carry out service and maintenance plumbing and domestic heating systems |  |

## Unit: TOEPH3-05 Size and Select Plumbing and Domestic Central Heating Systems

### GLH: **30**

### Relationship to the Apprenticeship Standard (England)

Maps to Standard Reference ST0303:

### Unit description

This unit is designed to enable learners learning in the design, of a complex range of plumbing and domestic heating systems in dwellings, including those in multi-storey properties and single occupancy dwellings fed by private water supplies.

Summary of learning outcomes

1. Size and select plumbing and domestic heating systems and components for dwellings

### Assessment

This unit is assessed by;

* A holistic assessment (design assignment) that will cover learning outcomes 1.1 – 1.8.

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| **1 Size and select plumbing and domestic heating systems and components for dwellings****1 Size and select plumbing and domestic heating systems and components for dwellings** | 1.11.1 | **Explain factors** that affect the selection of **plumbing and domestic heating systems** for dwellings**Explain factors** that affect the selection of **plumbing and domestic heating systems** for dwellings | **Cover:****Plumbing and domestic heating systems*** Cold water
* Hot water
* Central heating
* Sanitary appliances and pipework
* Rainwater

**Factors*** **All system types**
* Customer needs
* Building layout and features
* Energy efficiency
* Environmental impact
* Cost
* Legislation
* **Cold water, hot water and central heating**
* Occupancy and purpose
* Appliance location
* Storage type / location
* **Central heating**
* Heat source and circulating water temperature
* **Sanitary appliances pipework**
* Appliance type and location
* Drainage system type
* Pipework routes
* Access requirements
* **Rainwater**
* Rainfall intensity
* Roof area
* Roof pitch
* Outlet position
* Gutter fall
* Changes of direction in the gutter run
 |
| 1.2 | Identify i**nformation sources** required to size and select **plumbing and domestic heating systems** and components  | **Cover:****Information sources*** Statutory regulations
* Industry standards
* Manufacturers’ technical instructions
* Verbal and written feedback from the customer
* Plans and drawings
* Specifications
* Pre-determined data

**Plumbing and domestic heating systems*** Cold water
* Hot water
* Central heating
* Sanitary appliances and pipework
* Rainwater
 |
| **1 Size and select plumbing and domestic heating systems and components for dwellings** | 1.3 | Identify recommended **design temperatures** within cold water and hot water systems | **Cover:****Design temperatures*** **Cold water**
* Condensation consideration
* Storage (frost protection and undue warming)
* Appliance outlet
* **Hot water**
* Pipework
* Secondary circulation
* Storage
* Appliance outlet
 |
| 1.4 | Describe the principles of **heat loss and heat gain** and how this affects domestic heating requirements  | **Cover:****Heat loss and heat gain*** Electrical equipment
* Occupancy
* Solar
* Building fabric
* Ventilation
* Internal and external design temperatures
* Pipework
 |
| **1 Size and select plumbing and domestic heating systems and components for dwellings** | 1.5 | Calculate plumbing and domestic heating **system requirements** used in dwellings | **Cover:****System requirements*** **Cold water**
* Storage requirements
* Pipe size
* Outlet size and type
* **Hot water**
* Storage requirements
* Pipe size
* **Central heating**
* Water flow temperature
	+ Low temperature hot water heating (550 C and below)
	+ Traditional hot water heating (55oC and above)
* Total heat load
* Emitter load
* Hot water allowance
* Pipe size
* Pump size
* Emitter size
* Expansion
* **Sanitary appliances and pipework**
* Gradient
* Diameter
* Length
* Material
* System type
* **Rainwater**
 |
| **1 Size and select plumbing and domestic heating systems and components for dwellings** | 1.6 | Select plumbing and domestic heating **components** in accordance with calculations from predetermined data | **Cover:****Components*** **Cold water**
* Storage requirements
* Pipe size
* Accumulator
* Safety device
* Booster pump
* **Hot water**
* Storage vessel
* Pipe
* Pump
* Expansion vessel
* Safety device
* **Central Heating**
* Emitter
* Heat source
* Pipe
* Pump
* Expansion vessel
* **Sanitary appliances and pipework**
* **Rainwater**
 |
| **1 Size and select plumbing and domestic heating systems and components for dwellings** | 1.7 | Interpret information required to complete a detailed **materials list** | **Cover:****Material list*** **All system types**
* Quantities and grades
	+ Consumables
	+ Fittings
	+ Components
	+ Appliances
* **Cold water, hot water, central heating and sanitary appliances and pipework**
* Quantities and grades
	+ Pipework
* **Rainwater**
* Quantities and grades
	+ Pipe (RWP)
	+ Gutter
 |
| 1.8 | Present calculations and information in a suitable format for quotation and tender |  |

## Unit: TOEPH3-06 Electrical Work and the Control of Plumbing and Domestic Central Heating Systems

### GLH: **30**

### Relationship to the Apprenticeship Standard (England)

Maps to Standard Reference ST0303:

### Unit description

This unit is for plumbing and domestic heating technicians who as part of their normal activities carry out work on electrical supplies and/or circuits for the control of plumbing and domestic heating systems which:

* + Do not require the addition of a circuit to the fixed electrical installation.
	+ Will only be associated with the disconnection, installation and / or connection of electrical equipment and components associated with the supply and / or control of plumbing and domestic heating systems

The person performing this work must be able to comply with the correct procedures and practices for disconnecting, installing and / or connecting electrical equipment and components that supply and / or control plumbing and domestic heating systems.

This work must be in accordance with the current versions of the appropriate industry standards and regulations, the specification, industry recognised working practices, the working and natural environment. It will **not** involve the testing or commissioning of the fixed electrical installation and its constituent parts.

Operatives must know and understand the types, applications and limitations of electrical supplies, isolation and control equipment, earthing and overcurrent protection, cables and wiring associated with plumbing and domestic heating system work.

Summary of learning outcomes

1. Perform pre-installation activity prior to undertaking electrical work on plumbing and domestic heating systems
2. Apply industry standard safe isolation procedures
3. Carry out the safe installation, testing and decommissioning of electrical systems

### Assessment

This unit is assessed by:

* An externally set and marked on-screen MCQ examination, which assesses the knowledge requirements of learning outcome 1.1.
* A holistic assessment (practical) that will cover learning outcomes 1.2 – 1.4, 2.1 – 2.2 and 3.1 – 3.4.

|  |  |  |
| --- | --- | --- |
| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| 1. **Perform pre-installation activity prior to undertaking electrical work on plumbing and domestic heating systems**
 | 1.1 | State the limitations of your responsibility when carrying out work on electrical supplies and/or circuits for the control of plumbing and domestic heating systems  |  |
| 1.2 | Confirm the **status** of the electrical supplies | **Cover:****Status*** Live
* Dead
 |
| 1.3 | Confirmation, as necessary, that the electrical supply is suitable for the plumbing and domestic heating systems |  |
| 1.4 | Select, as required, electrical equipment, cables / wiring and components and confirm that they are: 1. of the right type and size
2. fit for purpose in accordance with the plumbing and domestic heating system’s design
 |  |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| 1. **Apply industry standard safe isolation procedures**
2. **Apply industry standard safe isolation procedures**
 | 2.1 | Identify the correct means of electrical isolation prior to commencing **work** | **Cover:****Work*** Disconnection
* Installation
* Connection
 |
| 2.22.2 | Carry out the safe isolation of **electrical equipment** and **components** associated with the **electrical supply** of the plumbing and domestic heating systemCarry out the safe isolation of **electrical equipment** and **components** associated with the **electrical supply** of the plumbing and domestic heating system (continued) | **Cover:****Electrical equipment*** Isolators
* Circuit breakers
* Fuses
* Switches
* Socket-outlets / fused-spurs
* Earthing protection

**Components*** Boiler
* Central heating controls
	+ Zone valves (2 port, 3 port, mid position and diverter)
	+ Programmer
	+ Timer
	+ Thermostats
	+ Programmable room stat
	+ Optimizer
	+ Weather compensators
	+ Frost stat
	+ Wiring Centre
	+ Cylinder stat
	+ Wi-fi routers
	+ Wi-fi range extenders
* Wiring Centres
* Immersion heater

**Electrical supply*** Extra low voltage and / or low voltage single phase provision for:
	+ Control
	+ Communication
	+ Heating
 |

| **Learning Outcomes****The learner will know and demonstrate:** | **Assessment Criteria****The learner can:** | **Coverage**  |
| --- | --- | --- |
| 1. **Carry out the safe installation, testing and decommissioning of electrical systems**
2. **Carry out the safe installation, testing and decommissioning of electrical systems**
3. **Carry out the safe installation, testing and decommissioning of electrical systems**
 | 3.13.1 | Carry out **work** on **electrical equipment**, **cables / wiring** and **components** associated with the **electrical supply** and control of the plumbing and domestic heating system in accordance with the requirements of: 1. industry recognised methods and procedures
2. manufacturers’ instructions

Carry out **work** on **electrical equipment**, **cables/wiring** and **components** associated with the **electrical supply** and control of the plumbing and domestic heating system in accordance with the requirements of: 1. industry recognised methods and procedures
2. manufacturers’ instructions

(continued) | **Cover:****Work*** Disconnection
* Installation
* Connection

**Electrical equipment*** Isolators
* Circuit breakers
* Fuses
* Switches
* Socket-outlets / fused-spurs
* Earthing protection
* Motor control equipment
* Control devices – electrical, electronic, electro-mechanical

**Cables / wiring*** PVC flat profile (twin and earth)
* Flex including heat resistant (butyl) rubber etc.

**Components*** Boiler
* Central heating controls
	+ Zone valves (2 port, 3 port, mid position and diverter)
	+ Programmer
	+ Timer
	+ Thermostats
	+ Programmable room stat
	+ Optimizer
	+ Weather compensators
	+ Frost stat
	+ Wiring Centre
	+ Cylinder stat
	+ Wi-fi routers
	+ Wi-fi range extenders
* Wiring Centres
* Immersion heater
* Pumps

**Electrical supply*** Extra low voltage and/or low voltage singlephase provision for~~:~~
	+ Control
	+ Communication
	+ Heating
 |
| 3.2 | Identify that the electrical equipment, cables / wiring and components are in accordance with the requirements of the plumbing and domestic heating system |  |
| 3.3 | Check that the electrical equipment, cables / wiring and components are of proper **construction** in accordance with the requirements of the plumbing and domestic heating system | **Cover:****Construction*** Insulation
* Mechanical strength
* Protection
 |
| 3.4 | Undertake functional testing of the electrical equipment and components associated with the electrical supply and control of the plumbing and domestic heating system in accordance with:1. industry recognised methods and procedures
2. manufacturers’ instructions
 |  |

# Appendix 1: Centre Examination Specification

|  |
| --- |
| **Assessment type:** Multiple-choice Question (MCQ) ExaminationNumber of questions: **60**Time Allowed: **120** Minutes**Open book** (A copy of Water Regulations Guide is permitted).**Pass mark:** 60%Each test will cover the knowledge learning outcomes of the modules as follows: |
| **Learning outcome** | **Knowledge learning outcome** | **Percentage coverage** |
| **Health and Safety** |
| 1 | Know the health and safety legislation that applies to the building services industry | 13% |
| 2 | Understand hazardous situations working in the building services industry |
| 3 | Apply personal protection measures |
| **Scientific principles** |
| 1 | Understand the units of measurement used in the plumbing and heating industry | 13% |
| 2 | Understand the properties of materials |
| 3 | Understand the principles of force and pressure and their application in the plumbing and heating industry |
| 4 | Understand the mechanical principles in the plumbing and heating industry |
| **Planning and Supervision** |
| 1 | Know how to communicate with others | 8% |
| 2 | Producing risk assessments and method statements for the plumbing and domestic heating systems industry |
| 3 | Producing a work programme for tasks in the plumbing and domestic heating systems industry |
| **Core plumbing systems** |
| 1 | Understand Plumbing and Domestic Central Heating Systems | 57% |
| 3 | Perform a soundness test plumbing and domestic central heating systems and components |
| 4 | Commission and handover plumbing and domestic heating systems and components |
| 5 | Perform fault diagnosis and rectification on plumbing and domestic heating system components |
| 6 | Carry out service and maintenance on plumbing and domestic heating system components and pipework |
| **Electrical Work and the Control of Plumbing and Domestic Central Heating Systems** |
| 1 | Perform pre installation activity prior to undertaking electrical work on plumbing and domestic heating | 8% |
| 2 | Apply industry standard safe isolation procedures |
| 3 | Carry out the safe installation, testing and decommissioning of electrical systems |
| **Total:**  | **100%** |

# Appendix 2: Learner Registration and 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 / pathway code:

|  |  |
| --- | --- |
| **Qualification Title:** | **Code:** |
| EAL Level 3 Technical Occupation Entry in Plumbing and Domestic Heating (Diploma) | 610/3914/7 |

For further information, please contact EAL Customer Experience:

Tel: +44 (0)1923 652 400

Email: Customer.Experience@eal.org.uk

Published by:

EAL

Unit 2, The Orient Centre

Greycaine Road

Watford

Herts

WD24 7GP

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