

# **T Level Technical Qualification in Building Services Engineering for Construction**

**8710-355 Heating Engineering**

**Grade Standard Exemplification Material  
Distinction - Summer 2023**

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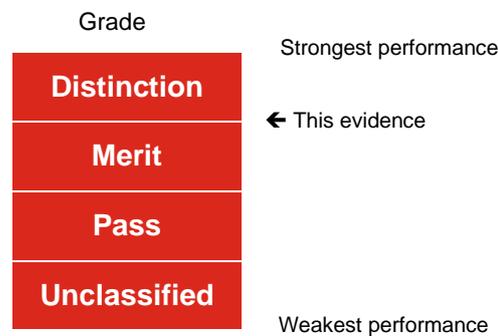
# Introduction

## Summer 2023 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2023 assessment series to achieve a distinction grade for the 8710-355 Heating Engineering Occupational Specialism (OS).

The aim of these materials is to provide examples of knowledge, skills and understanding that attested to distinction competence in summer 2023. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and standard of performance will vary across tasks.

The Occupational Specialism is graded Distinction, Merit, Pass or Unclassified.



The distinction grade boundary is based on a synoptic mark across all tasks. The materials in this Grade SEM are separated into two sections as described below. Materials are presented against a number of tasks from the assignment.

## Task

This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photograph/video evidence. Candidate evidence that was or was not included in this Grade SEM has also been identified within this section.

In this Grade SEM there is candidate evidence from:

- Task 1 - Planning the Installation
- Task 2 - Installation, Commission and Decommission
- Task 3 - Carry out maintenance

## **Candidate evidence**

This section includes exemplars of candidate work, photographs of the work in production (or completed) and practical observation records of the assessment completed by provider assessors. This was evidence that was captured as part of the assessment and then internally marked by the provider assessor.

The Occupation Specialism brief and tasks can be downloaded from [here](#).

## **Important things to note:**

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments (Vocational and technical qualifications grading in 2023 – Ofqual blog), whilst also recognising the standards required for these qualifications.
- The evidence presented, as a whole, was sufficient to achieve the distinction grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than distinction grade).

## Grade descriptors

**To achieve a distinction, a candidate will be able to:**

Demonstrate an exemplary performance that fully meets the requirement of the brief and is able to enter the industry to begin to work in the occupational area.

Demonstrate exemplary technical skills in cutting, bending, fixing pipework and installing components that is in line with industry standards. They will also demonstrate relevant and comprehensive knowledge and understanding of heating principles and processes through the tasks completed.

Work safely and make informed and appropriate use of tools, materials and equipment within the heating environments that they are working in.

Competently and independently interpret information and apply the technical skills to practical tasks and procedures to an exemplary standard as recognised by industry, producing an excellent quality of work that meets acceptable tolerances, regulations and standards.

Confidently attempt some complex tasks and the level of performance meets an exemplary level.

Identify causes and diagnose heating faults and have a thorough understanding and the skills to be able to repair and rectify them.

Consistently use accurate industry terminology in both written and verbal contexts.

## Task 1 – Planning the Installation

<b>Assessment number (eg 1234-033)</b>	8710-355
<b>Assessment title</b>	Occupational Specialism

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	1
<b>Evidence title / description</b>	Materials list Method statement Risk assessment Installation diagram
<b>Date submitted by candidate</b>	DD/MM/YY

# Task

## Task 1 – Planning the Installation

### Assessment themes:

- Health and safety
- Design and planning
  - Documents
  - Drawings and diagrams
- Systems and components
  - Installation
  - Decommissioning

The purpose of this task is for you to demonstrate you can correctly plan the installation, produce a detailed material list, complete a detailed method statement, assess the risks involved in the installation activity and produce an accurate installation diagram showing the pipework layout, pipe clips and control components.

You will be provided with the scenario brief and given time to plan the installation of the pipework to the existing boiler, magnetic filter, the S Plan Plus heating system controls and LST radiator circuit in the children's nursery.

### **a) Plan the installation of pipework to existing boiler, magnetic filter, S Plan Plus heating system and LST radiator circuit in the children's nursery, following the client brief.**

You should produce the following:

- Materials list
- Method statement to include planning your sequence of work and associated risks (to include justifications)
- Risk assessment
- Installation diagram with pipework layout, pipe clips and associated components

Templates for the method statement, materials list and risk assessment have been provided.

The installation diagram should be applicable to the location you are being assessed in and the diagram completed to a commercially acceptable standard. The diagram should include all fixed services and the proposed installation layout. (Task 1 - Drawing Grid can be used if required).

The installation diagram should be used by you to carry out the installation and will also be used by your tutor/assessor for checking the dimensional tolerances of the installed system and pipework.

### **b) Measure and mark out proposed working area.**

You will be provided with a specific working area that has been set up according to Figure 1.

You must measure and mark out your work area as detailed in your diagram.

You must complete this activity prior to carrying out the installation.

If you provide plans that are not fit for purpose it is expected that your tutor/assessor will intervene and provide necessary feedback and corrections to the plans prior to you carrying out the installation. However, this will be commented on in the marking documentation and reflected in marks awarded.

### **Conditions of assessment:**

- The time allocated for this task is 5 hours
- You must carry out the task on your own, under controlled conditions

### **What must be produced for marking:**

- Risk assessment
- Method statement to include planning your sequence of work and associated risks (to include justifications)
- Installation diagram with pipework layout, pipe clips and associated components
- Materials list

### **Additional evidence of your performance that must be captured for marking:**

Practical Observation Form your detailing tutor/assessor's observations on:

- accuracy of measurements and marking out (of space allocation/ work area checked against installation drawing)
- marking out in comparison with the proposed plan and completed drawing
- accuracy of recording of key dimensions
- Photographs taken by your tutor/assessor at various stages of the task.

## Candidate evidence

### Completed materials list

Equipment/Materials	Quantity
15mm Copper	1 length (3m)
22mm copper pipe	3 lengths (9m)
Motorised valves	3
22mm copper tees	4
22mm to 15mm reducing valve	2
Drain off valves	3
Manual air pip	1
Lockshiled valve	1
22mm Elbows	6
TRV	1
Decorator radiator valve cap	1
Underfloor heating manifold	1
Low surface temperature radiator	1
15mm copper tees	2

## **Completed method statement**

# **T-Level Plumbing and Heating Method Statement**

## **PPE and Regulations**

First of all, before any work begins correct PPE must be worn, this includes work trousers, gloves if necessary for the work and steel toe capped work boots to protect your feet from falling objects. Regulations will also have to be followed, these include Regulation Part L (Conservation of Fuel and Power) and Building Regulations Part G. This will mean clipping distances must be 100mm apart and a filter must be installed on the return pipework into the boiler. Along with this I will also make sure that the bay maintains a constant level of tidiness because this can greatly reduce the risk of tripping me and anyone else in the bay.

## **Preparation**

To prepare the bay I will take some time to map out the plan from my design onto the wall. Once I have marked everything according to the design, I will install clips as this will make the pipework easier to install. Before I carry out the plumbing work, I will also get all the materials and tools I require to be more efficient.

## **Installation of the Pipework**

The beginning of the installation will consist of me installing the radiator and underfloor heating manifold. I will make sure both have been installed level by using a boat level and a spirit level for the radiator. I will install these first as I personally find it easier to install the pipework up to the radiator and manifold other than vice versa. I will then cut out all the correct pipe lengths and connect them to the fittings and clips. This will ensure that I have correctly designed and made sure that all the pipe lengths are correct before I solder the pipework. Components to be aware of are the motorized valves and the filter. The filter will have to be installed on the return pipe to the boiler. This is now required under Building Regulation L and is necessary since it will filter out any magnetic debris flowing in the pipes, before it is able to reach the boiler, which can cause damage in the long term. 3 motorised valves will also be installed. One will be on the flow to the radiator, one be on the flow to the underfloor heating manifold and the last on the flow pipe to the cylinder. All these will be connected to an S Plan Plus system that will control the flow of hot water from the boiler to all of these systems. I will also make sure that on the lowest part of the hot and cold pipework there will be drain off valves, these allow you to drain out the system. I will then solder the pipework and clean it off using wire wool, this will reduce the risk of corrosion,

whilst I solder, I will also be careful not to use too much flux, this is common mistake among many plumbers that leads to green corroded pipework. I will also use a heatproof mat as I solder to ensure no walls are damaged from the heat, however this should not be a problem since I will simply point the blowtorch away from the walls whilst I heat up the pipework. Once all this has been completed, I will commission the system.

### **Electrical Installation**

The electrical installation requires all 3 motorised valves to be wired up to the control panel. This means I will have to safely isolate the electrics first. To safely isolate the electrics, I will pull out the fuse from the fuse spur and lock it. I will then test the electrics using a voltage tester. I will do this by testing that the equipment works, if it does then I will test the electrics to check for voltage, if there is none then I can once again make sure that the kit works by testing it after. If it shows up as working on the last test, then I can be assured that I would have safely isolated the electrics. I will then begin to wire the pumps onto the control panel, following my instructions carefully.

### **Commissioning**

Before any commissioning begins, I will make sure all drain off valves, manual air pips and taps are closed. I will then open any valves that need to be opened for testing such as the filter valves. Once I am certain everything is ready. It is also essential that I make sure the motorised valves work when they are closed and open. I will do this by adjusting the controls on the S Plan Plus. Because it is a sealed system, I will fill up the system by turning on the mains and opening the filling loop and check for any leaks. If there are any leaks, then I will drain the system and address the leaks, then repeat the commissioning process over again.

### **Handover**

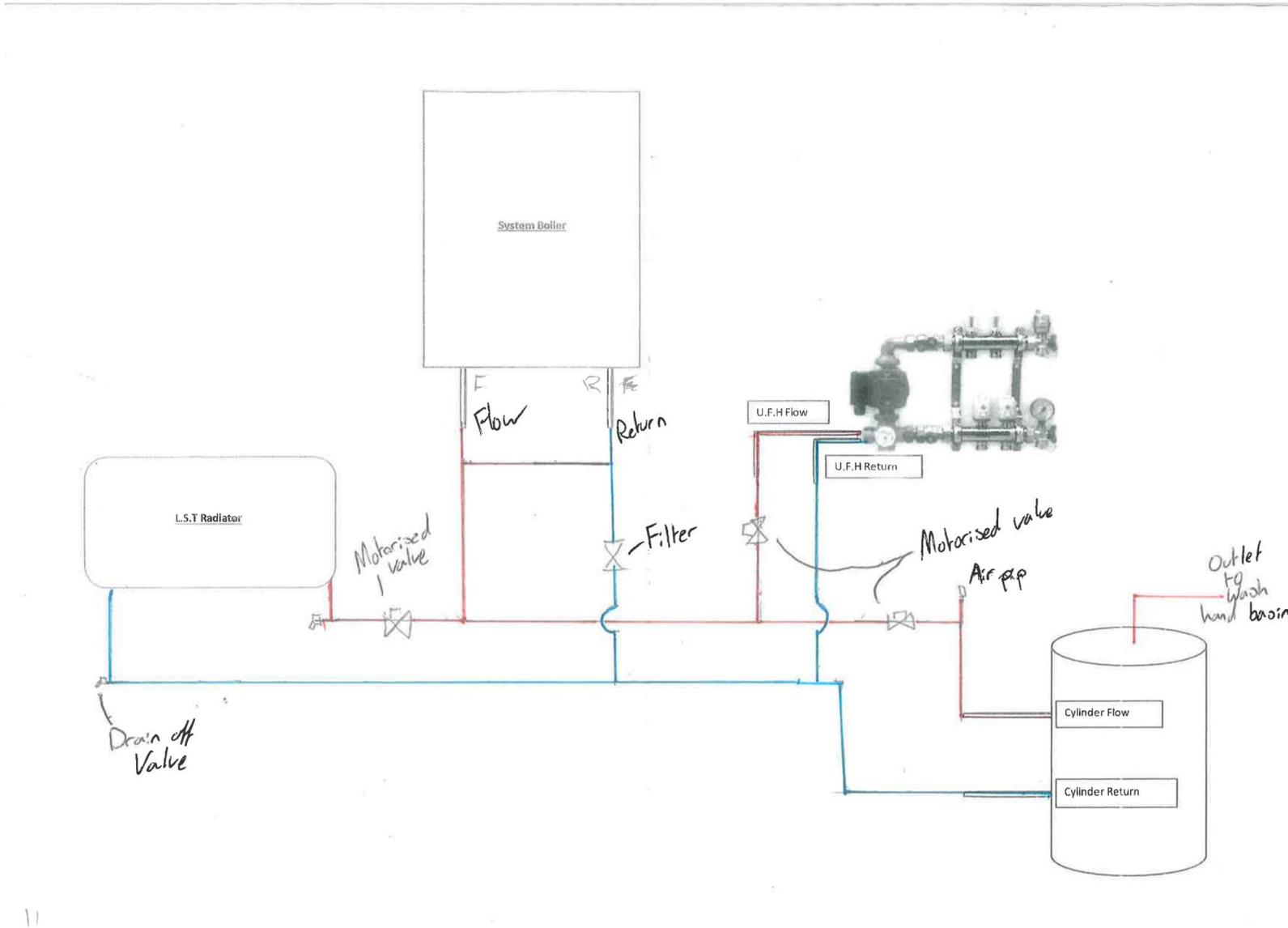
For the handover I will go over the system and how it operates. This will inform the client on what they should do if the system is not working, it will also let the client know how they can use their new system. Any questions are also answered in the handover stage.

## Completed risk assessment

<b>SEVERITY (S): Degree of harm which may be caused (including numbers affected)</b> 1 Minor Injury    2 Major Injury    3 Fatality  <b>LIKELIHOOD (L): Probability that event will occur</b> 1 Remote            2 Possible            3 Likely						<b>RISK RATING (RR): Severity x Likelihood</b>  1-2 Low 3-5 Medium 6-9 High	
:	Activity	Hazard	Persons at Risk	Existing Controls (Mitigation)	S 1-3	L 1-3	RR
1	Dropping Equipment	Damaging your feet or other people	The installer	Taking caution when holding heavy equipment and wearing the correct PPE	1	3	3
2	Leakages	Causing mold and decay within a structure	The structure	Having a tray, dustsheets and towels that can catch water and prevent it going into the floor or structure.	1	3	3
3	Using a blowtorch	Setting flammable materials alight with a blowtorch causing burns	The structure, installer and anyone nearby	Keeping the blow torch and any combustibles in a safe space where they will not be knocked over and taking precaution with flammable materials like keeping them away from the blow torch.	2	1	2
4	Incorrect movement and use of body	Long-term bad knees and back.	The installer	Make sure to lift using your legs and to wear knee pads whenever working on your knees.	2	3	6
5	Having a messy workspace	A hazard of tripping	Anyone in the workspace	Making sure the works area is consistently tidy	1	2	2
6	Working on electrics	Possibility of getting electrocuted	The installer or anyone that may encounter the electrical current	Making sure electrics are always safely isolated before work, testing for current and by using temporary continuity bond cables	1	3	3

7	Using power tools	Tripping over power tools lead, damage from vibrations and noise	The installer and anyone in the workplace	Wear PPE such as earplugs to reduce noise, take regular breaks to reduce vibrations impact and make sure the cable is out the way of people and of tools.	1	2	2
8	Using flux	Getting flux in cuts and in sensitive areas	The installer	Wearing gloves when working with flux and covering any wounds.	1	3	3
9	Asbestos	Disturbing asbestos whilst at work	Anyone in the workspace and who inhales it	Taking precaution when working in older buildings, and calling in a special asbestos team to clear asbestos	2	3	6
10							

# Completed installation diagram



# Practical Observation (PO) Form (Task 1)

8710-35/36 T Level Technical Qualification in Building Services Engineering for Construction

8710-355 Heating Engineering (Summer 2023)

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234
<b>Date</b>	DD/MM/YY

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds Provider No.</b>	666666a

## Task 1 assessment themes:

- Health and safety
- Design and planning
  - Documents
  - Drawings and diagrams
- Systems and components
  - Installation
  - Decommissioning

Record observation notes below to inform internal marking and external moderation. Notes must be detailed, accurate and differentiating which use terminology from the mark grid along with specific examples observed. Notes must identify areas of strength and weakness, distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.

<b>Assessment Themes</b>	<b>Assessor observation notes</b>
<b>Health and safety</b> <ul style="list-style-type: none"><li>• Risk assessment</li><li>• Risk mitigation</li><li>• Harm and probability factors</li><li>• Adherence to health and safety</li></ul>	<p>Risk assessment is complete and includes consideration for a wide range of risk factors.</p> <p>Adhered to safe working practices by keeping working areas clean, neat, tidy, and free from any hazards. Also took care to make sure he protected the working area. Good attempts to make sure he was working safely.</p>
<b>Design and planning (documents)</b> <ul style="list-style-type: none"><li>• Quality of documentation</li><li>• Adherence to brief</li></ul>	<p>Good effort on the method statement that includes logical order, some links to brief but limited.</p> <p>Has not listed all the materials required for the task in materials list.</p>

<p><b>Design and planning (drawings and diagrams)</b></p> <ul style="list-style-type: none"> <li>• Accuracy</li> <li>• Positioning</li> </ul>	<p>Candidate was able to understand installation drawings and layout to complete tasks and was able to position components correctly.</p> <p>Used colours to identify flow and return and labelled components.</p> <p>Some lines could have been neater by the use of a ruler.</p>
<p><b>Systems and components (installation)</b></p> <ul style="list-style-type: none"> <li>• Marking out</li> <li>• Measurements</li> <li>• Sequencing</li> <li>• Tolerances</li> <li>• Tools</li> <li>• Skills</li> </ul>	<p>Please reference PO2 – as comments made in PO2 are for both planning and install (holistic).</p>
<p><b>Systems and components (decommissioning)</b></p> <ul style="list-style-type: none"> <li>• Sequencing</li> <li>• Disposal</li> <li>• Waste removal</li> <li>• Techniques and finish</li> </ul>	<p>Please reference PO2 – as comments made in PO2 are for both planning and install (holistic).</p>

<b>Any other aspects</b>

<b>Internal assessor signature</b>	<b>Date</b>
<p>X _____</p>	<p>DD/MM/YY</p>

If completing electronically, double click next to the 'X' to add an electronic signature once the record is **finalised**.

## Task 2 – Installation, Commission and Decommission

<b>Assessment number (eg 1234-033)</b>	8710-355
<b>Assessment title</b>	Occupational Specialism

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	2
<b>Evidence title / description</b>	Commissioning record
<b>Date submitted by candidate</b>	DD/MM/YY

# Task

## Task 2 – Installation, Commission and Decommission

### Assessment themes:

- Health and safety
- Systems and components:
  - Installation
  - Decommissioning
- Reports and information
- Inspecting and testing of systems and components
- Handover and communication

You will have access to your drawing and plans from Task 1.

Your tutor/assessor will ensure that systems are fully decommissioned, and walls prepared, prior to you beginning installation.

**a) Install the pipework to the existing boiler, magnetic filter, S Plan Plus heating system and the LST radiator circuit in accordance with your drawing and as agreed by your tutor/assessor.**

All central heating flow and return pipework to the radiator should be 100 mm centre to centre unless otherwise stated or agreed with your tutor/assessor.

All pipework is to be clipped directly to the wall surface with the pipe brackets at a maximum 600 mm spacing.

All pipe bends must be carried out with the correct size pipe bending tool.

Marking out and final measuring of installed components and pipework is to be within +/- 2 mm.

All pipework to be installed level and plumb.

No burns or excessive marking to walls/property.

Finished product should be aesthetically pleasing.

Good housekeeping to be maintained throughout assessment

**b) Wire the 2 port valves into the wiring centre, following the safe isolation process.**

You must wire the 2 port valves into the existing wiring centre using a wiring diagram supplied by your tutor/assessor.

The safe isolation procedure should be followed and directly observed by your tutor/assessor.

All power, interconnecting and control wiring must be in accordance with manufacturer's requirements and meet current UK regulations.

### **c) Commission the system (pipework only) and handover to customer**

Once the installation has been completed, you must commission the system and handover to the customer.

The system will then be commissioned as per the commissioning document provided, with all the data recorded in full.

Your tutor/assessor must observe you carrying out the commissioning checks detailed in the commissioning document.

You must record all data in full on the commissioning document provided.

Following commissioning and testing you will handover to the customer. The handover should include:

- Demonstration of system operation and controls

Your tutor/assessor will act as the customer during the handover and will capture notes on your performance.

### **d) Decommission the system**

Once your tutor/assessor has checked and verified the system and handover is complete, you must decommission the system.

Decommissioning procedure:

- isolation of the fuel/electricity supply to the system as appropriate
- isolate water supply
- apply warning notices and signs
- drain system to a suitable location
- remove required pipework, radiator and controls
- repair and paint wall surfaces as required

### **Conditions of assessment:**

- The time allocated for this task is 12 hours
- You must carry out the task on your own, under controlled conditions

### **What must be produced for marking:**

- Commissioning checklist

**Additional evidence of your performance that must be captured for marking:**

Tutor/assessor observations of:

- Installation of system and components
- Safe isolation
- Commissioning
- Handover to customer
- Decommissioning

Photographs taken by your tutor/assessor at various stages of the task.

## Candidate evidence

### Completed commissioning record

Heating Commissioning Sheet	
Address	<provider name>
Engineer's Name	<first name> <surname>
Date	DD/MM/YY
Boiler Manufacturer	Airston
Model	CLAS HE system
Serial Number	3665070 23 120 170000632
Rating in kW	24
Type of system	Open/Sealed
Type of control system	S-Plan Plus
Type of cylinder installed	Open vented/Unvented
TRVs fitted	Yes/No
Magnetic filter fitted	Yes/No

Commissioning Information	
Has the system been flushed	Yes/No
Has inhibitor been added to the system	Yes/No
What inhibitor was added to the system?	Sentinal x100
Boiler flow temperature	72°C
Boiler return temperature	62°C
Hot water temperature at nearest outlet	50.4°C

<b>Hot water flow rate at the nearest outlet</b>	22 litres per min
<b>Does the system comply with current regulations</b>	<input checked="" type="radio"/> Yes <input type="radio"/> No
<b>Has the system been installed and commissioned in compliance with manufacturer instructions</b>	<input checked="" type="radio"/> Yes <input type="radio"/> No
<b>Have instruction been left with the customer and have they received a demonstration of system controls</b>	<input checked="" type="radio"/> Yes <input type="radio"/> No

# Practical Observation (PO) Form (Task 2)

8710-35/36 T Level Technical Qualification in Building Services Engineering for Construction

8710-355 Heating Engineering (Summer 2023)

<b>Candidate name</b>	<first name><surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234
<b>Date</b>	DD/MM/YY

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds Provider No.</b>	999999a

## Task 2 assessment themes:

- Health and safety
- Systems and components:
  - Installation
  - Decommissioning
- Reports and information
- Inspecting and testing of systems and components
- Handover and communication

Record observation notes below to inform internal marking and external moderation. Notes must be detailed, accurate and differentiating which use terminology from the mark grid along with specific examples observed. Notes must identify areas of strength and weakness, distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.

<b>Assessment theme</b>	<b>Assessor observation notes</b>
<b>Health and safety</b> <ul style="list-style-type: none"><li>• Risk assessment</li><li>• Risk mitigation</li><li>• Harm and probability factors</li><li>• Adherence to health and safety</li></ul>	<p>Performed a visual risk assessment of the work area and implemented necessary measures to ensure safety.</p> <p>Safe isolation procedure to make bay safe and minimize potential hazards.</p> <p>Proactive approach to protecting the client's property by utilizing heat mats and keeping trays nearby. Good awareness and displayed competent level of health and safety awareness.</p> <p>Conscious of health and safety – good use of toolbox and trays to store materials.</p>

<p><b>Systems and components (installation)</b></p> <ul style="list-style-type: none"> <li>• Marking out</li> <li>• Measurements</li> <li>• Sequencing</li> <li>• Tolerances</li> <li>• Tools</li> <li>• Skills</li> </ul> <p><b>Systems and components (decommissioning)</b></p> <ul style="list-style-type: none"> <li>• Sequencing</li> <li>• Disposal</li> <li>• Waste removal</li> <li>• Techniques and finish</li> </ul>	<p>Very good skills in marking out the task, paying attention to detail to ensure it aligned with the specified requirements and measurements were accurate.</p> <p>Approached the task with a professional and methodical mindset, meeting high standards of workmanship.</p> <p>Produced soldered joints of good quality, good techniques used for soldering process.</p> <p>Handling of tools was very good and used most of his own tools.</p> <p>Very good standard of skill sets, he has worked on practicing his pipe bending and soldering skills and his onsite experience has really helped him.</p> <p>Demonstrated a methodical and well-organized approach.</p> <p>Followed a clear and logical sequence of steps, ensuring that each component of the heating system was safely disconnected and removed in the appropriate order.</p> <p>Efficiently gathered and removed waste materials from the work area, maintaining cleanliness throughout the process.</p> <p>Excellent efforts to make working area neat and tidy – filling and painting working areas.</p>
<p><b>Reports and information</b></p> <ul style="list-style-type: none"> <li>• Quality of documentation</li> </ul>	<p>Report is detailed and includes good information, links to brief.</p> <p>Includes some reasoning and justifications, logical and methodical approach.</p> <p>He enjoyed this task.</p>
<p><b>Inspecting and testing of systems and components</b></p> <ul style="list-style-type: none"> <li>• Commissioning tests</li> <li>• Commissioning checks</li> <li>• Reference to / follows manufacturer's instructions</li> </ul>	<p>He had no issues in commissioning the systems and made use of the manufacturer's instructions to help him complete the commissioning certificate to meet industry standards.</p> <p>Good ability to use testing equipment, followed correct sequence and recorded accurate results.</p>

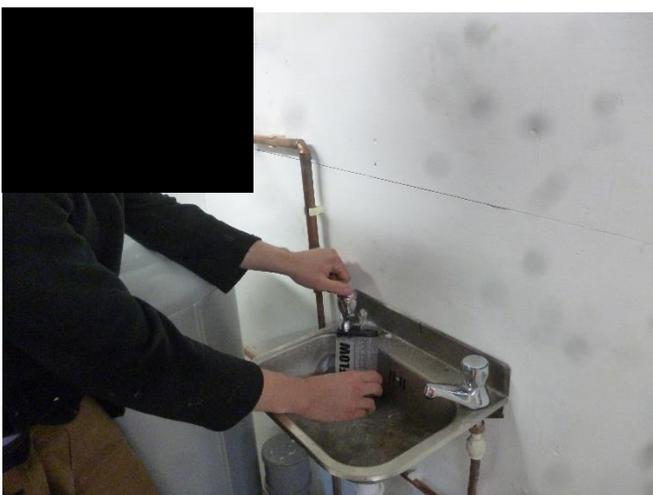
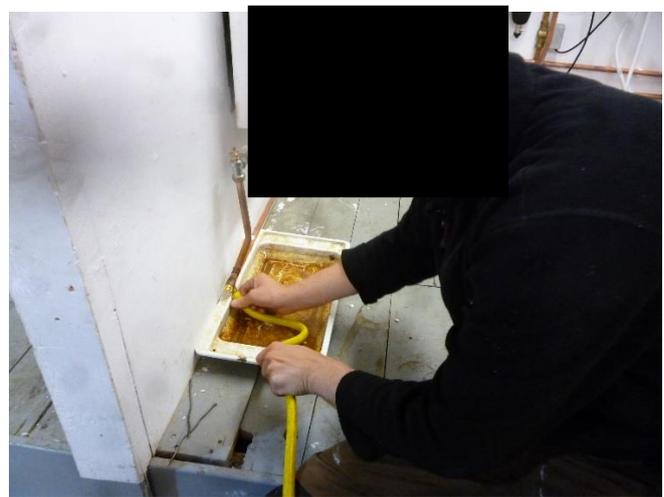
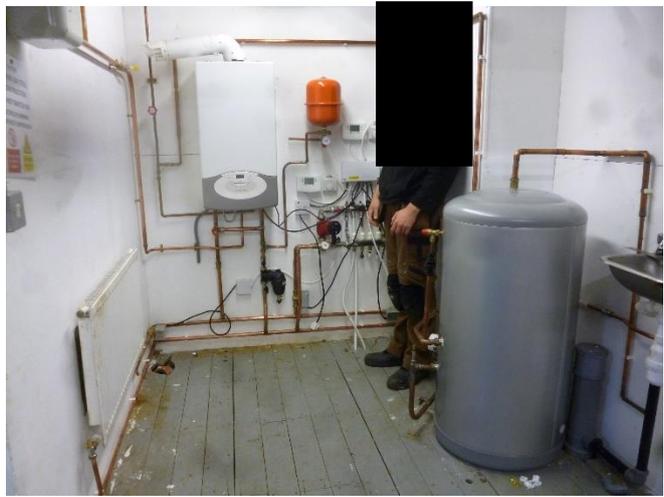
<p><b>Handover and communication</b></p> <ul style="list-style-type: none"> <li>• Customer Care</li> <li>• Demonstration of system</li> <li>• Communication</li> </ul>	<p>Good level of interaction with customer – good attention to detail. Asked relevant questions.</p> <p>Good level of professionalism and respect during the handover process</p> <p>Demonstration of system was good, accurate although there was minor misconceptions which were corrected through tutor questioning.</p>
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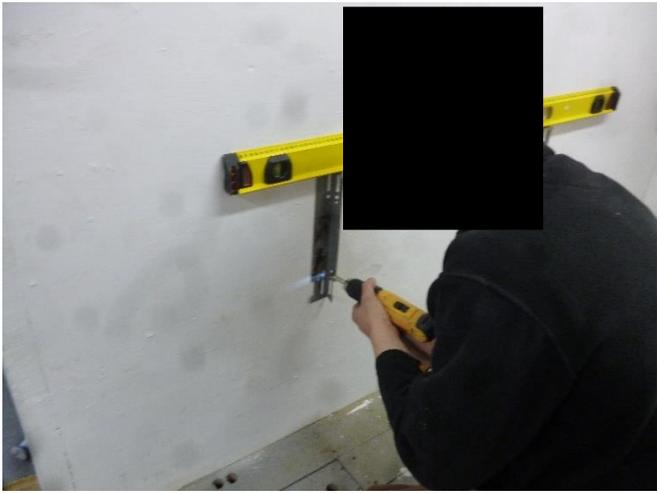
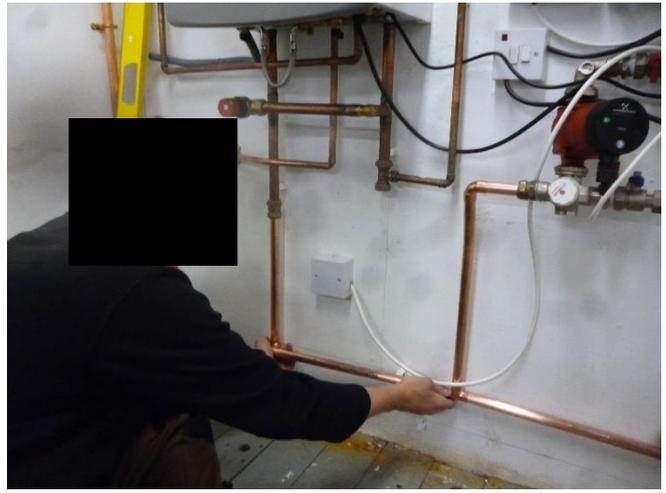
**Any other aspects**

Internal assessor signature	Date
	DD/MM/YY

If completing electronically, double click next to the 'X' to add an electronic signature once the record is **finalised**.

## Photographic evidence





## Task 3 – Carry out maintenance

<b>Assessment number (eg 1234-033)</b>	8710-355
<b>Assessment title</b>	Occupational specialism

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	3
<b>Evidence title / description</b>	Written report of the maintenance activity
<b>Date submitted by candidate</b>	DD/MM/YY

# Task

## Task 3 – Carry out maintenance

### Assessment themes:

- Health and safety
- Reports and information
- Handover and communication
- Working with faults

### You must:

#### a) Discuss the fault with the customer, investigate and diagnose.

You must discuss the central heating fault with your tutor/assessor to determine the cause of the fault and suggest appropriate methods for repair. You will be assessed on your ability to ask relevant questions to determine fault and to select a suitable solution.

Your tutor/assessor will act as the customer during the maintenance discussion and record any feedback on the Practical Observation Form.

You will inspect a pre-installed operational central heating system with faults placed on various components within the system for you to diagnose and locate.

You will be required to carry out testing to identify **one** fault as given by your tutor/assessor and replace the faulty component. If you do not initially identify the fault component, you are allowed to be prompted by your tutor/assessor but this must be reflected in the marking.

Once you have diagnosed the fault, you should check with your tutor/assessor to ensure this has been done correctly. Should you require additional feedback and guidance this should be reflected in the marking.

#### b) Produce a written report detailing the maintenance activity.

Once fault diagnosis is confirmed, you must produce a written report detailing the maintenance activity to include:

- Details of the fault
- How to repair the fault
- Detailed process of how you will repair the system

### **c) Repair and rectify fault**

This task requires you to:

- Isolate and/or drain down the heating system safely
- Apply temporary continuity bonding
- Install replacement component as required
- Refill system and commission to ensure no leaks are evident
- Wire the component

#### **Conditions of assessment:**

- The time allocated for this task is 3 hours
- You must carry out the task on your own, under controlled conditions.

#### **What must be produced for marking:**

- A written report of the maintenance activity.

#### **Additional evidence of your performance that must be captured for marking:**

- Tutor/assessor observations of:
  - Discussion with customer
  - Fault diagnosis
  - Rectification of fault
- Photographs taken by your tutor/assessor at various stages of the task.

## **Candidate evidence**

### **Completed written report of the maintenance activity**

## **Plumbing and Heating T-Level Fault Finding**

### **Consulting the Client**

Firstly, I must understand what the fault is with the customer's system. I will ask the customer what is wrong and ask them questions to help me gain an understanding of what the problem is. In this case the customer is complaining that the radiator is not getting hot. I will inform the client of what work will need to be carried out and how long it will take and whether any water pipes that will affect them will need to be shut off.

### **Finding the Fault**

To see if there is any water coming through the radiator, we can open a vent or a drain of valve coming from the radiator. We also know that there is no problem with the boiler since the hot water cylinder is heating up. The cause of this problem will be the motorised valve allowing hot water to the central heating. A new motorised valve will need to be installed.

### **Pre-Installation**

Before installation of the new motorised valve begins the system will need to be drained from a drain off valve. A tray or bucket will be placed under motorised valve to catch any water left in the pipes and a dustsheet placed down to prevent any damage to the floor. To prevent electrocution, I will clamp some temporary continuity bond cables to the pipe on either side of the motorised valve to avoid the risk of electrocution. I will also wear appropriate work equipment such as work trousers as may get wet.

### **Safe Isolation**

Before carrying out the work I will also need to safely isolate the mains. I will do this by pulling out the switch and taking out the fuse and placing a lock over it. The keys must always stay with me. Using a safe isolation kit, I will first test to see if it works, once I know it does, I will test the circuit for any voltage, I'll then test to see if the kit works again. Then I will be able to carry out work knowing that the electrics are safely isolated.

## **Installation**

I will loosen the nuts of either end of the mortised valve and take it out above the tray letting all debris and water go into the tray. I will disconnect the motorised valve from the electrics. I will simply fit in the motorised valve into the spot the old one used to be. If it is a different size, then I will have to adjust the pipe sizes. I will then reconnect it to the circuit

## **Commissioning**

For the commissioning I will first check for any leaks. I will need to adjust the controls of the valve to ensure that it works whilst open and closed. If it works, then the commissioning will be complete.

## **Handover**

For the handover I will inform the client of what to do if it happens again, this will be to call a plumber as this is not a job, they can fix themselves. There will not be much to handover since in most cases motorised valves will just need to be replaced due to technical fault in the electrical part of the valve.

# Practical Observation (PO) Form (Task 3)

8710-35/36 T Level Technical Qualification in Building Services Engineering for Construction

8710-355 Heating Engineering (Summer 2023)

<b>Candidate name</b>	<first name><surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234
<b>Date</b>	DD/MM/YY

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds Provider No.</b>	999999a

## Task 3 assessment themes:

- Health and safety
- Reports and information
- Handover and communication
- Working with faults

Record observation notes below to inform internal marking and external moderation. Notes must be detailed, accurate and differentiating which use terminology from the mark grid along with specific examples observed. Notes must identify areas of strength and weakness, distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.

Assessment theme	Assessor observation notes
<b>Health and safety</b> <ul style="list-style-type: none"><li>• Risk assessment</li><li>• Risk mitigation</li><li>• Harm and probability factors</li><li>• Adherence to health and safety</li></ul>	Carried out visual inspection of the bay to work safely. Good use of dust sheets to protect customer's property. Good awareness of health and safety.
<b>Reports and information</b> <ul style="list-style-type: none"><li>• Quality of documentation</li></ul>	Good effort with logical approach and some detail to work. Health and safety considered.
<b>Handover and communication</b> <ul style="list-style-type: none"><li>• Customer Care</li><li>• Demonstration of system</li><li>• Communication</li></ul>	Good level of communication skills demonstrated professional approach to task. Good demonstration of system and explained it well. Had one prompt.

<p><b>Working with faults</b></p> <ul style="list-style-type: none"> <li>• Systematically / logically</li> <li>• Knowledge of fault-finding techniques</li> <li>• Reference to / follows manufacturer's instructions</li> <li>• Fault rectification</li> <li>• Efficiency / accuracy</li> <li>• Use of tools</li> </ul>	<p>Systematic approach to the task, logical thinking.</p> <p>Good investigation of fault and mostly accurate – one misconception.</p> <p>Followed a logical process for rectification.</p> <p>Competent use of tools.</p>
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<b>Any other aspects</b>

Internal assessor signature	Date
<p>X _____</p>	<p>DD/MM/YY</p>

If completing electronically, double click next to the 'X' to add an electronic signature once the record is **finalised**

## Photographic evidence



## Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

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E: [technicals.quality@cityandguilds.com](mailto:technicals.quality@cityandguilds.com)

W: <http://www.cityandguilds.com/tlevels>

Web chat available [here](#).

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