

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

**Heating Engineering**

**Guide standard exemplification material**

**Distinction – Sample 2021**

Version and date	Change detail	Section
June 2021 v1.0	Initial document.	All.
July 2021 v1.1	Transfer of existing content into updated document template	All

## Contents

<b>Introduction</b>	<b>4</b>
<b>Grade descriptors</b>	<b>5</b>
Candidate evidence .....	7
Installation diagram .....	7
Candidate evidence .....	8
Practical Observation Form – Measuring and marking out of proposed working area.....	8
Photographic evidence.....	9
<b>Commentary</b>	<b>10</b>
<b>Commentary</b>	<b>15</b>
<b>Candidate evidence Method statement</b>	<b>16</b>
<b>Commentary</b>	<b>17</b>
Materials list .....	18
<b>Commentary</b>	<b>19</b>
<b>Task 2 – Installation, Commission and Decommission</b>	<b>20</b>
<b>Candidate evidence Practical Observation Form – Safe isolation</b>	<b>22</b>
<b>Commentary</b>	<b>22</b>
Candidate evidence .....	23
Practical Observation Form – Installation of components and pipework .....	23
Photographic evidence.....	25
<b>Commentary</b>	<b>29</b>
Candidate evidence .....	30
Practical Observation Form – Commissioning.....	30
<b>Commentary</b>	<b>30</b>
Candidate evidence .....	31
Practical Observation Form – Handover to customer .....	31
<b>Commentary</b>	<b>31</b>
Candidate evidence .....	32
Practical Observation Form – Decommissioning .....	32
Photographic evidence.....	33
<b>Commentary</b>	<b>34</b>
<b>Task 3 – Carry out maintenance</b>	<b>35</b>
Candidate evidence .....	36
Written report of maintenance activity .....	36

**Commentary** **36**

    Candidate evidence Practical Observation Form – Fault diagnosis and fault  
    rectification.....37

    Photographic evidence.....39

**Commentary** **41**

## Introduction

The sample assessment materials within this document refer to the heating engineering sample occupational specialism assignment. The aim of these materials is to provide centres with examples of knowledge, skills and understanding that attest to distinction competence. In this document all exemplar evidence attests as examples of distinction competence. The examples provided do not reflect all evidence from the sample assignment as the focus of this material is the quality and standards that need to be achieved rather than the volume of exemplar evidence provided. However, the examples provide a representative of all tasks in the sample assignment. 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 task and minimal threshold competence will be based on a synoptic mark across all tasks.

The materials in this GSEM are separated into three 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 photographic evidence. Also referenced in this section are the assessment themes the candidates will be marked against when completing the tasks within it. In addition, candidate evidence that has been included or not been included in this GSEM has been identified within this section.

In this GSEM there is candidate evidence from:

Task 1

Task 2

Task 3

### Candidate evidence

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

### Commentary

This section includes detailed comments to demonstrate how the candidates evidence attests to the standard of distinction by directly correlating to the grade descriptors for this occupational area. Centres can compare the evidence against the performance indicators in the marking grid descriptors within the assessor packs, to provide guidance on the standard of knowledge, skills and understanding that need to be met for distinction.

It is important to note that the commentary section is not part of the evidence or assessment but are evaluative statements on how and why that piece of evidence meets a particular standard.

## 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. They will 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

(Assessment themes: Health and Safety, Design and planning, Systems and components)

For task 1 candidates need to produce the following pieces of evidence:

- Risk assessment
- Method statement with justifications
- Installation drawing with pipe layout, pipe clips and associated controls
- Materials list
- Assessor observation of measurements and marking out of space allocation/ work area checked against drawing

For illustration, the guided exemplification materials (GSEM) for Task 1 contain examples of candidate evidence for the following assessment requirements only:

- Risk assessment
- Method statement with justifications
- Installation diagram with pipe layout, pipe clips and associated controls
- Materials list
- Assessor observation of measurements and marking out of space allocation/ work area checked against drawing

### Photographic evidence required:

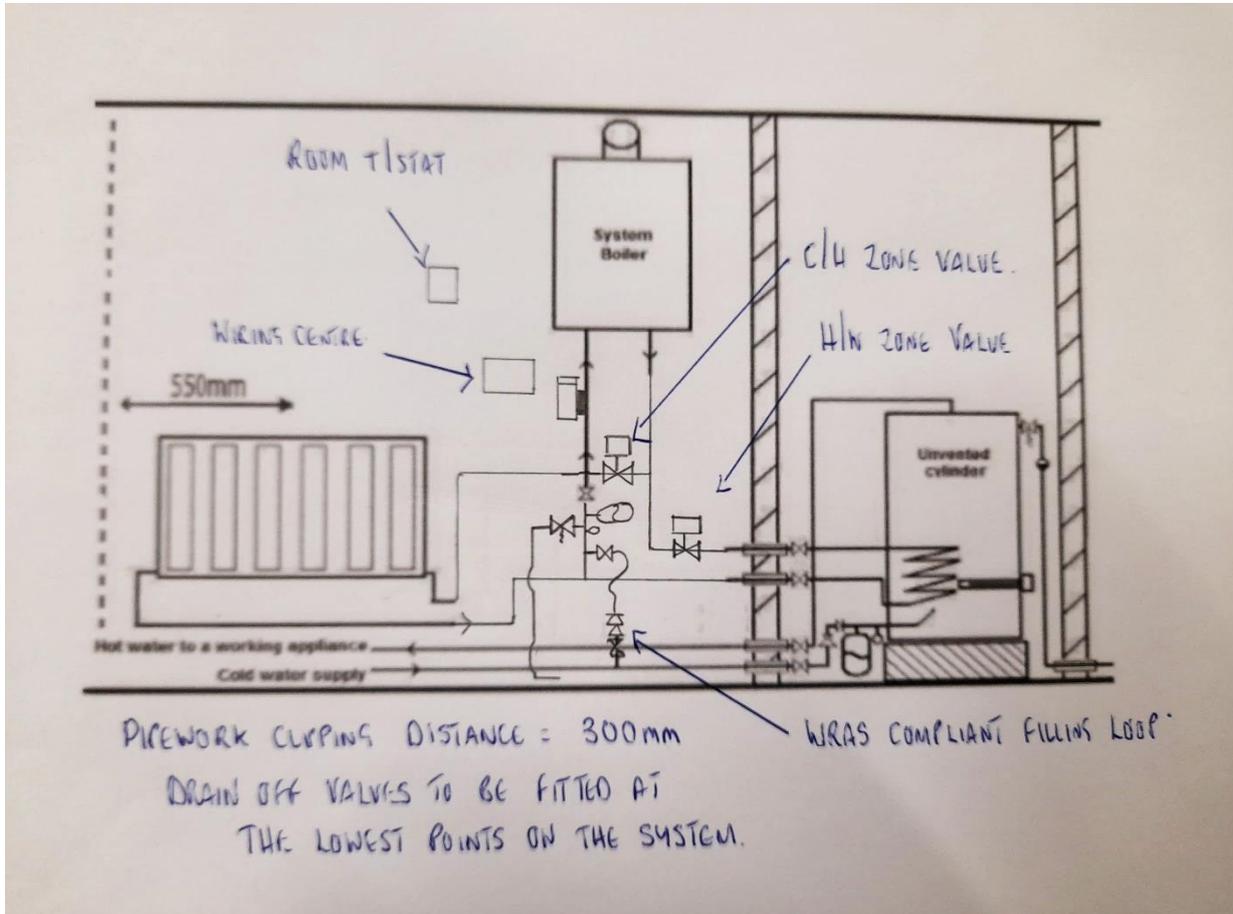
Measuring and marking out of proposed working area

Photographic evidence which shows:

- Appropriateness of method and equipment used to measure and mark out. Photos should show use of correct measuring equipment and correct marking out of pipework – **Photographs 1 and 2.**

## Candidate evidence

### Installation diagram



### Commentary

The candidate has completed the installation diagram considering all aspects required to meet the assignment brief.

The candidate demonstrates excellent knowledge and understanding of heating components and has correctly identified all of the associated components and controls and positioned them in the correct order on the diagram. The pipe clips are clearly displayed and the distance between each clip has been noted.

The installation diagram has been annotated to include accurate pipework layout and correct pipework connections to the system.

The candidate shows an excellent understanding of the requirements of installation diagrams and the overall drawing is clear, detailed, well presented, with detailed annotation.

The candidate identifies the WRAS approved filling loop, demonstrating a thorough understanding of the water regulations.

## Candidate evidence

### Practical Observation Form – Measuring and marking out of proposed working area

<b>Assessment ID</b>	<b>Qualification number</b>
8710-355	8710-36
<b>Candidate name</b>	<b>Candidate number</b>
Candidate A	CG12345
<b>Centre name</b>	<b>Assessment theme</b>
City & Guilds	Systems and components (Installation)

Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

<b>Task</b>	<b>Notes – detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</b>
Measuring and marking out of proposed working area	The candidate has followed the correct and logical process for marking out. The candidate installed a datum line to work from and this enabled them to establish the correct levels for the installation. This resulted in all dimensions being taken and recorded accurately and free from errors.

<b>Assessor signature</b>	<b>Date</b>
Assessor A	31/01/2021

## Photographic evidence

Appropriateness of method and equipment used to measure and mark out. Photos should show use of correct measuring equipment and correct marking out of pipework.

### Photograph 1



Candidate marking out a work area using a spirit level to provide a straight and vertical line on the first attempt.

### Photograph 2



Work area shows accurate and clear marking out on work surface.

## Commentary

The candidate demonstrates that they can take measurements from an allocated space/work area in line with their installation diagram.

The candidate used measuring equipment, which was best practice for this task, which resulted in measurements that were accurate.

The measurements were recorded accurately and clearly.

The pipe clips have been marked out and the spacing is equal, showing an excellent consideration to the aesthetics of the finished installation.

## Candidate evidence

### Risk assessment

This risk assessment may be modified by adding items only.

<b>Activity: Installation of pipework</b> <b>Location: Centre A</b>		<b>Date: 31/01/21</b> <b>Position: Candidate</b>						
<b>SEVERITY (S): Degree of harm which may be caused (including numbers affected)</b> <b>1 Minor Injury   2 Major Injury   3 Fatality</b>						<b>RISK RATING (RR): Severity x Likelihood</b>		
<b>LIKELIHOOD (L): Probability that event will occur</b> <b>1 Remote          2 Possible          3 Likely</b>						<b>1-2 Low</b> <b>3-5 Medium</b> <b>6-9 High</b>		
Item No:	Activity:	Hazard	Persons at Risk	Existing Controls (Mitigation)	S 1-3	L 1-3	RR	Are the Risks Controlled?
1	Soldering	Burn/ fire	Self	Handle soldering equipment with care  Use wet rag to cool hot pipework  Fire extinguisher	2	1	2	Yes
2	Electrical wiring	Death Shock	Self	Carry out safe isolation procedure under supervised conditions and ensure appliance is locked off	3	1	3	Yes
3	Spilt water	Slipping	Self Others	Keep working area clean and tidy  clear away any spillages to reduce risk	2	1	2	Yes

4	Loose Cables	Tripping	Self Others	Stick all electrical cables down with cable guards or with tape where possible to reduce risk of tripping	1	2	2	Yes
5	Hazardous substances	Asphyxiation/ irritation/ contamination/ ingestion	Self	Correct use of PPE – wearing gloves. Correct ventilation  Personal hygiene. Refer to material data sheet	2	1	2	Yes
6	Manual handling	Personal injury	Self	Correct kinetic lifting techniques.  Awareness of maximum lifting weight. Suitable training	2	1	2	Yes

<b>Activity: Decommissioning</b>		<b>Date: 31/01/21</b>						
<b>Location: Centre A</b>		<b>Position: Candidate</b>						
<b>SEVERITY (S): Degree of harm which may be caused (including numbers affected)</b>						<b>RISK RATING (RR): Severity x Likelihood</b>		
1 Minor Injury    2 Major Injury    3 Fatality						1-2 Low		
<b>LIKELIHOOD (L): Probability that event will occur</b>						3-5 Medium		
1 Remote            2 Possible            3 Likely						6-9 High		
<b>Item No:</b>	<b>Activity:</b>	<b>Hazard</b>	<b>Persons at Risk</b>	<b>Existing Controls (Mitigation)</b>	<b>S 1- 3</b>	<b>L 1- 3</b>	<b>RR</b>	<b>Are the Risks Controlled?</b>
1	Hazardous waste	Potential for foul waste and contaminated pipework from flux's or other waste materials	Self	Correct use of PPE including gloves  Wash hands carefully and dispose of contaminate waste in suitable location to remove risk from contaminants	1	1	1	Yes

2	Wet surfaces	Slips and trips	Self Others	Ensure all installation pipework is adequately drained to minimise the volume of water that could escape onto floor surface  Clear away any spilt liquids to reduce risk of slips/trips	2	1	2	Yes
3	Scolding	Personal injury	Self	Ensure heating system has cooled prior to drain down	1	1	1	Yes
4	Manual handling	Personal injury	Self	Correct kinetic lifting techniques.  Awareness of maximum lifting weight. Suitable training	2	1	2	Yes

<b>Activity: Maintenance</b>		<b>Date: 31/01/21</b>						
<b>Location: Centre A</b>		<b>Position: Candidate</b>						
<b>SEVERITY (S): Degree of harm which may be caused (including numbers affected)</b>  1 Minor Injury    2 Major Injury    3 Fatality					<b>RISK RATING (RR): Severity x Likelihood</b>  1-2 Low 3-5 Medium 6-9 High			
<b>LIKELIHOOD (L): Probability that event will occur</b>  1 Remote            2 Possible            3 Likely								
Item No:	Activity:	Hazard	Persons at Risk	Existing Controls (Mitigation)	S 1-3	L 1-3	RR	Are the Risks Controlled?
1	Pipework	Cut	Self	Take care when handling and removing the valve as pipework exposed edges could be sharp. Wear suitable disposable gloves if appropriate	1	2	2	Yes

2	Wet surfaces	Slips and trips	Self Others	Watch out for any wet surfaces around the working area and wipe away any spillages to reduce risk of slips and trips.  Affix warning notice (slippery or wet floor if appropriate)	2	1	2	Yes
---	--------------	-----------------	----------------	--	---	---	---	-----

## Commentary

The candidate demonstrates a thorough knowledge and understanding of the different types of risk and hazards associated with heating activities. The candidate has identified all hazards and associated risks for each of the tasks.

The candidate demonstrates excellent understanding of the mitigations that can be used to minimise the identified risks and hazards, and has identified and provided thorough detail for the identified control/s.

The probability of each of the hazards/ risks occurring has been accurately identified for each of the hazards.

## Candidate evidence

### Method statement

Ensure you have the correct PPE which includes steel toe cap boots, boiler suit and heat proof hi visibility vest to ensure risk of personal injury is limited and in line with risk assessment.

I will then carry out a visual inspection to make sure my workspace is safe; I will move anything that is unwanted out of the way. I will also put a dust sheet down in my working area to keep it protected and tidy.

After this, I will indicate the component and pipework layout in pencil on the work surface to the correct measurements in line with the drawing as well as the manufacturer's instructions and ensuring the use of a datum line and spirit level to ensure all components and pipe-runs will be accurate. I will install the boiler to all manufacturer instructions and the radiator will be installed to a recommended installation height of 300 mm from floor level.

Collect all pipework, fittings and necessary tools required to complete the installation in line with my materials list, also checking that all the fittings and materials are British standard kite marked. This is an imprint on each fitting and show that they are of the right quality for purpose. I will put them in a safe place in the working area where they are easily accessible but do not cause a trip hazard.

Measure from the centre line for the radiator brackets and install the brackets for the boiler and radiator according to the specification and manufacturer's instructions and install all the appropriate pipe clips at equal distancing to both provide support and ensure the installation is aesthetically pleasing. I will then carefully and accurately measure the pipe lengths and make allowance for any X dimensions to allow for pipe gain and then cut the copper pipe to the required length, then continue to pull any angles, kicks, or passovers needed for the task.

Once all pipework is prefabricated, I would then install the pipework and add the fittings tightening any compression joints to provide some stability. When happy with the fit of the installation pipework, I will dismantle all joints and clean thoroughly and apply flux to all the mating surfaces of the capillary joints that are to be soldered, this will allow the solder to run smoothly once heat is applied and ensure that the installation is watertight and free from leaks. Solder all the copper joints ensuring all surfaces are protected from damage using a suitable heat mat or shield.

Test all copper pipework for leaks with a hydraulic pressure tester to ensure the joints are free from leaks when pressurised. Carry out the installation of the wiring of the s plan controls after confirming with assessor it is okay to proceed making sure to follow the correct safe isolation process to a high degree of accuracy detailed in the isolation report.

Following on from this I would commission the system and complete the associated paperwork

Then I would hand over the completed and tested installation to the assessor.

## Commentary

The candidate demonstrates a comprehensive understanding of the sequencing of activities in relation to the given tasks, detailing all aspects of the install for example, marking out tasks, collecting materials and marking out dimensions for fittings on straight pipe runs clearly demonstrating excellent understanding of system installation processes.

The methods given follow the logical and methodical stages of the installation, for example, dry fixing the installation for accuracy prior to soldering.

The method statement is detailed and accurate, and reasoning has been provided to support the methods and process given, for example carrying out a visual inspection to make sure my workspace is safe and hydraulic pressure testing to ensure the joints are free from leaks.

## Materials list

Equipment/Materials	Quantity
Pencil	1
Spirit level	1
Tape measure	1
Pipe slice	1
Pipe bending machine	1
Philips screwdriver	1
Adjustable spanners	2
Plug and vent	1
Wire Wool	1
Flux/flux brush	1
PTFE	1
Heat proof mat	1
Blow torch	1
15mm pipe	3
22mm pipe	6
Radiator valves	2
Solder	1
Power drill	1
Flat file	1
Screws	20
15mm/22mm clips	10
Boiler	1
Radiator	1
Filling loop	1
Expansion vessel	1
Expansion valve	1
Pressure gauge	1
Clean cloths	2
S Plan control pack	1
Magnetic filter	1
½" Steel pipe	3
½" elbows	2
½" tee	1
½" drain off	1
Fl copper (½" x 22mm)	2
15mm End feed elbow	2
15mm End feed tee	1
22mm End feed elbow	5
15mm End feed tee	1
15mm Drain off valve	1
22mm x 15 mm reducer	1
<b>PPE</b>	
Boiler suit/protective clothing	
Gloves	
Steel toe capped boots	
Goggles	

## Commentary

The candidate shows excellent knowledge and understanding of the different resources required to carry out the tasks and meet the requirements of the assignment brief.

The quantities listed are accurate and relevant to the task.

The candidate has selected all the materials and equipment required to meet the requirements of the installation, consideration has been given to the finished aesthetics of the installations, with the inclusion of cleaning cloths to allow the fixing of the brassware to be carried out with no tooling damage.

The candidate demonstrates a good understanding of health and safety and listed the PPE required to carry out the tasks safely, as well as including heat proof mats and dust sheets which demonstrates consideration to customer property.

The candidate has considered aspects of health and safety and listed the PPE required to carry out the tasks safely.

The candidate identifies individual fittings such as elbows and tees with quantities for each, showing an excellent knowledge and understanding of the different fixing methods, fitting types and jointing methods.

## Task 2 – Installation, Commission and Decommission

(Assessment themes: Health and Safety, Systems and components, Reports and information, Inspecting and testing systems and components, Handover and communication)

For task 2 candidates need to produce the following pieces of evidence:

- Commissioning checklist
- Assessor observations:
  - Installation of components
  - Safe isolation process
  - Commissioning
  - Handover to customer
  - Decommissioning

For illustration, the guide standard exemplification materials (GSEM) for task 2 contain examples of candidate evidence for the following assessment requirements only:

- Assessor observations:
  - Installation of components
  - Safe isolation process
  - Commissioning
  - Handover to customer
  - Decommissioning

The following task 2 candidate assessment requirements have not been included as example candidate evidence for this version of the guide standard exemplification materials.

- Commissioning checklist

### Photographic evidence

Installation of components

Photographic evidence which shows:

- Tolerances have been met for the measurement of pipework – **Photograph 3.**
- Finished installation showing finished pipework and component positioning which demonstrates the aesthetics of the completed installation – **Photographs 4a-e, 5 and 6**
- Use of tools (bending and cutting equipment) and piping skills – **Photograph 7**
- Results of tool usage – **Photograph 8**
- Soldering/soldered fittings to show that heat mats have been used and no burn/scorch marks to the wall/or burn marks to the wall to support the assessors making of the jointing process – **Photograph 9**
- Use/type of clips – **Photograph 10**

## Decommissioning

Photographic evidence which shows:

- The system being drained down safely and economically to the correct location – **Photograph 11**
- Decommissioning of pipework and components for the system installation – **Photograph 12**
- The finish of the working area after decommissioning following filling and repainting of surfaces – **Photograph 13**

## Candidate evidence

### Practical Observation Form – Safe isolation

<b>Assessment ID</b>	<b>Qualification number</b>
8710-355	8710-36
<b>Candidate name</b>	<b>Candidate number</b>
Candidate A	CG12345
<b>Centre name</b>	<b>Assessment theme</b>
City & Guilds	Health and safety

Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

<b>Task</b>	<b>Notes – detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</b>
Safe isolation	<p>Candidate was confident in describing the industry safe isolation procedure, and how they planned to proceed with the task and described a clear logical sequence giving reasons to the process that would eliminate any risk of injury.</p> <p>Candidate correctly selected all the equipment required, including voltage indicator, lock off kit, correct signage.</p> <p>The candidate correctly checked the testing equipment and confirmed operation before continuing with tests to prove supply was DEAD. The candidate could clearly articulate the purpose of each step in ensuring the electrical supply was correctly isolated. Candidate correctly identified signage and placed notices to advise the system was isolated and tested.</p>

<b>Assessor signature</b>	<b>Date</b>
Assessor A	31/01/2021

### Commentary

Candidate demonstrated an excellent knowledge and understanding of the safe isolation process and was able to identify all steps and carried the process out confidently in the correct sequence.

## Candidate evidence

### Practical Observation Form – Installation of components and pipework

<b>Assessment ID</b>	<b>Qualification number</b>
8710-355	8710-36
<b>Candidate name</b>	<b>Candidate number</b>
Candidate A	CG12345
<b>Centre name</b>	<b>Assessment theme</b>
City & Guilds	System and components

Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

<b>Task</b>	<b>Notes – detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</b>
Installation of components	<p>Candidate prepared the workspace with consideration to health and safety and good housekeeping, by putting dust sheets on floor, collecting all the correct equipment and storing tools and materials in safe location. Candidate maintained workspace throughout and adhered to the risk assessment throughout the installation.</p> <p>Candidate details any pre-existing marks or damage to the wall prior to marking out for their installation.</p> <p>Candidate set about the task in a highly organised manor and prefabricated lengths of pipework including bends to ensure accuracy, consistency and efficiency</p> <p>Candidate prepared the workspace using accurate clipping distancing to support the installation of pipework. This was installed with 400mm spaces with attention to aesthetics and ensuring pipework is parallel and secured.</p> <p>The radiator was installed as per manufacturer’s instructions and the candidates drawing, was installed at a suitable height and centre dimension from the datum line however when measured was not completely accurate but within 2mm of tolerance.</p> <p>Candidate has effectively marked out and measured pipework to suitable lengths to carry out the installation, with no wastage of materials</p>

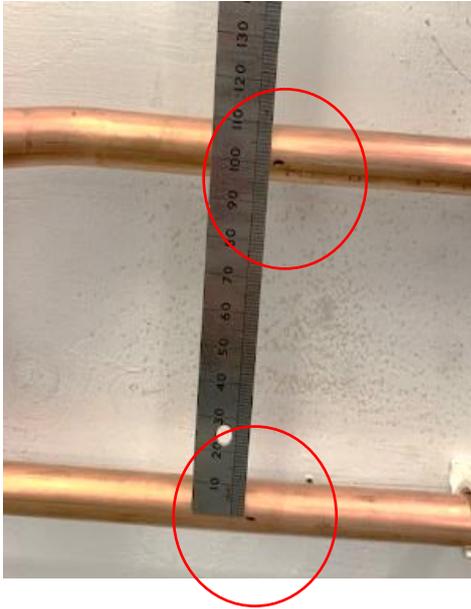
<b>Task</b>	<b>Notes</b> – <i>detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</i>
	<p>All tolerances met throughout the installation producing a piece of work that was aesthetically pleasing.</p> <p>All S Plan central heating components were installed and wired as per the manufacturer instructions.</p> <p>Magnetic filter has been correctly positioned and installed as per manufacturer instructions</p> <p>Candidate correctly selects and uses tools, resulting in no tooling marks to components. Pipework skills result in no wasted materials</p>

<b>Assessor signature</b>	<b>Date</b>
Assessor A	31/01/2021

## Photographic evidence

Tolerances have been met for the measurement of pipework.

**Photograph 3**



Tolerance of (+/-2mm) have been met during the installation of pipework.

Finished installation showing finished pipework and component positioning which demonstrates the aesthetics of the completed installation.

**Photograph 4a**



**Photograph 4b**



Finished installation including appliances and pipework to tolerances/standards. Overall aesthetics of the installation have been met.



**Photograph 4c**



**Photograph 4d**



**Photograph 4e**

Copper pipework installation

**Photograph 5**



Pipework installed to the required tolerance ( $\pm 2\text{mm}$ ). Bends have been completed to a high standard with no signs of throating or rippling.

Pipework level

**Photograph 6**



Pipework level and within tolerance. ( $\pm 2\text{mm}$ )

Use of tools (bending and cutting equipment) and piping skills.

**Photograph 7**



Fabricated passover with appropriate clearance. no signs of throating or rippling.

Results of tool usage

**Photograph 8**



Component fitted correctly with no signs of tool marks from installation.

Soldering/soldered fittings to show that heat mats have been used and no burn/scorch marks to the wall/or burn marks to the wall to support the assessors making of the jointing process.

**Photograph 9**



Correct use of blow lamp, safe soldering, correct selection of solder, protection of customer property with heat mat centrally positioned. Removal of vulnerable heat sensitive components before soldering commences.

Use/type of clips  
**Photograph 10**



Pipework level and adequately clipped with appropriate spacing. Pipework fabricated without the use of additional fittings.

## Commentary

Candidate demonstrates a thorough understanding of the installation requirements. The correct process is followed, and the candidate demonstrates an ability to sequence tasks logically as set out in their method statements.

The candidate prepares the workstation with dust sheets and stores tools safely, showing a good consideration and understanding of health and safety throughout the duration of the task.

The candidate is confident in the practical elements of the task and is able to correctly select and use appropriate tools and components, for the given tasks. The candidate demonstrates excellent skills throughout the installation, for example pipework skills result in no wasted materials, use of tools result in no tooling marks, showing an excellent consideration of the aesthetics of the finished installations.

The candidate prefabricates all the pipework and meets all tolerances to produce and installation piece that was accurate first time.

## Candidate evidence

### Practical Observation Form – Commissioning

<b>Assessment ID</b>	<b>Qualification number</b>
8710-355	8710-36
<b>Candidate name</b>	<b>Candidate number</b>
Candidate A	CG12345
<b>Centre name</b>	<b>Assessment theme</b>
City & Guilds	Inspecting and testing of system and components/ reports and information

Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

<b>Task</b>	<b>Notes – detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</b>
Commissioning	<p>Candidate follows correct process for commissioning tests using manufactures instruction for the heating system to ensure no aspects of the commissioning had been omitted.</p> <p>After completing the visual inspection and soundness test, the candidate carried out operational checks on all the components including a functional test, temperature checks and flow rates at outlets.</p> <p>Candidate completed the commissioning in line with manufacturer instructions which included a cold flush, hot flush using chemical cleaner and filled the system with inhibitor.</p> <p>Candidate completed commissioning records in line with industry requirements.</p>

<b>Assessor signature</b>	<b>Date</b>
Assessor A	31/01/2021

### Commentary

The candidate demonstrates an excellent understanding of commissioning and completes the required commissioning tests and checks for the installation in a logical sequence, beginning with the visual inspection and then carrying out all operational and performance tests and checks accurately and efficiently.

Candidate makes reference to manufacturer’s guidance at all relevant stages during the task.

Candidate records all relevant information from the commissioning checks accurately on the commissioning checklists.

## Candidate evidence

### Practical Observation Form – Handover to customer

<b>Assessment ID</b>	<b>Qualification number</b>
8710-355	8710-36
<b>Candidate name</b>	<b>Candidate number</b>
Candidate A	CG12345
<b>Centre name</b>	<b>Assessment theme</b>
City & Guilds	Handover & communication

Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

<b>Task</b>	<b>Notes – detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</b>
Handover to customer	<p>Candidate interacts well with customer using eye contact and open body language. Candidate gives information about location of key components and gave a full demonstration. Candidate provided detail of maintenance requirements and service requirements. Candidate makes reference to manufactures instructions at relevant stages of the task.</p> <p>Candidate interacts well with customer using eye contact and open body language. Candidate gives information about location of hot water and cold water and explains the operating principles of the appliances.</p> <p>Candidate provides detail of maintenance and service requirements for both installations. Candidate makes reference to manufactures instructions at relevant stages of the task.</p>

<b>Assessor signature</b>	<b>Date</b>
Assessor A	31/01/2021

### Commentary

The candidate demonstrates an excellent understanding of the handover process and the operating principles of the systems and these were explained to the customer as part of the handover. The handover of the system to the customer was clear and accurate, and all details were covered.

The candidate displayed excellent customer care skills, ensuring eye contact and positive interaction with the customer throughout the handover.

## Candidate evidence

### Practical Observation Form – Decommissioning

<b>Assessment ID</b>	<b>Qualification number</b>
8710-355	8710-36
<b>Candidate name</b>	<b>Candidate number</b>
Candidate A	CG12345
<b>Centre name</b>	<b>Assessment theme</b>
City & Guilds	Systems and components

Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

<b>Task</b>	<b>Notes</b> – <i>detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</i>
Decommissioning	<p>Candidate follows a logical sequence for decommissioning.</p> <p>Candidate follows safe working practices throughout the duration of the task.</p> <p>Candidate removes fragile components first to limit risk of damage and where appropriate returned them into original packaging.</p> <p>Candidate removed as much of the straight lengths of pipework that could be reused and securely stored them. Candidate cut out any fitting containing solder and disposed of these into a contaminate recycling and then continued to remove pipework that was not contaminated with solder but could not be reused as it contained bends and offsets and correctly disposed of these separately to the contaminated waste.</p> <p>Candidate endeavored to make good the working area with the use of appropriate fillers and sanded back completely resulting in a good quality surface before applying a top coat of paint to restore the work are to pre-installation condition.</p>

<b>Assessor signature</b>	<b>Date</b>
Assessor A	31/01/2021

## Photographic evidence

The system being drained down safely and economically to the correct location.

**Photograph 11**



Preparation for draining down: correct equipment and drain point used to drain down system pipework for decommissioning activities.

Use of correct signage.

Decommissioning of pipework and components for the system installation.

**Photograph 12**

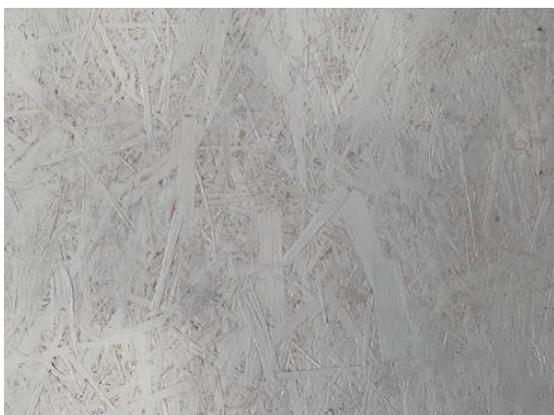


Pipework decommissioned correctly with consideration of recycling and reuse.

Separation of clean/dirty copper.

The finish of the working area after decommissioning following filling and repainting of surfaces.

**Photograph 13**



No holes and marks evident following decommissioning of pipework and surface preparation.

## Commentary

The candidate demonstrates a comprehensive understanding of the decommissioning process and demonstrates the ability to sequence tasks logically whilst decommissioning the system.

The candidate correctly identified all the components that can be reused, showing a thorough knowledge of reuse or recycling of materials.

The candidate followed the correct process for the safe disposal of waste and all components were recycled correctly.

The candidate shows an excellent understanding of the methods and materials/ resources required to keep the working area clean and presentable. The candidate completed all of the process, filling holes, re-painting and sanding back, resulting in a high-quality finish, demonstrating excellent consideration to customer property.

House-keeping was excellent and candidate cleaned all water spillages and debris from sanding.

## Task 3 – Carry out maintenance

(Assessment themes: Reports and information, Handover and communication, Working with faults)

For task 3 candidates need to produce the following pieces of evidence:

- A written report of the maintenance activity
- Assessor observations
  - Fault diagnosis
  - Rectification of fault
  - Assessor feedback of discussion with customer

For illustration, the guided exemplification materials (GSEM) for Task 3 contain examples of candidate evidence for the following assessment requirements only:

- A written report of the maintenance activity
- Assessor observations
  - Fault diagnosis
  - Rectification of fault
  - Discussion with customer

### Photographic evidence required:

Fault diagnosis and rectification of fault

Photographic evidence which shows:

- Results of tool usage – **Photograph 14**
- Sequence of photos which show the replacing and removal of the faulty component, and reinstallation of the new component – **Photographs 15, 16, 17, 18 and 19**
- System on completion of all works – **Photograph 20**

## Candidate evidence

### Written report of maintenance activity

#### Maintenance activity

##### **FAULT No Central Heating**

##### **Description of fault diagnosis**

I liaised with the customer asking suitable questions to check if they had hot water or the no central heating problem was isolated to one part of the property as this would confirm that either the problem was with the individual radiators or an issue with one of the system components. After discussion with my assessor and initial investigations I was able to confirm that there was a fault on the installation and traced this to the defective pump which was not circulating the water around the full system

##### **Possible solutions**

I decided the best solution to this problem was to isolate the pump from the water supply, isolate the electrics then replace the faulty pump. I had to be confident that the pump valves would isolate the system to reduce the risk of water damage to the customer property. I also need to consider safe isolation of the electrical supply

##### **Actions taken to rectify fault**

To repair the fault I carried out the following sequence

- Inform customer I was about to isolate the system and apply warning notices
- Isolate the electrical supply
- Isolate the pump at the pump valves
- Apply temporary continuity bonds
- Place a container under the pump to catch any water
- Open the screw on the pump to ensure it was correctly isolated
- Disconnect the pump from the electrics
- Remove the pump and replace it with a new one.
- Ensure the compression connections are tight
- Turn on the water supply and check for leaks.
- Reconnect the electrics
- Remove continuity bonds
- Turn on heating system and check operation including bleeding radiators as required.
- Inform customer of completed repair

Appendix 1

## Commentary

The maintenance report completed is clear and detailed.

The candidate demonstrates excellent understanding of the maintenance requirements, for the given task. The planned process for carrying out the repair is accurate, and reasoning has been given to support the methods selected to rectify the fault.

The candidate shows thorough consideration for industry processes of maintenance activities, for example reference has been made to informing the customer and to the use of manufacturer instructions.

## Candidate evidence

### Practical Observation Form – Fault diagnosis and fault rectification

<b>Assessment ID</b>	<b>Qualification number</b>
8710-355	8710-36
<b>Candidate name</b>	<b>Candidate number</b>
Candidate A	CG12345
<b>Centre name</b>	<b>Assessment themes</b>
City & Guilds	Working with faults/ Handover & communication

Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

<b>Task</b>	<b>Notes</b> – <i>detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</i>
Fault diagnosis and customer discussions	<p>Candidate displays very good customer interaction with positive body language and asked questions with appropriate tone along with a good use of eye contact that put the customer at ease.</p> <p>The candidate asked various meaningful questions to gain an insight into the fault and explained well to the customer that the responses to the questions were allowing an insight into the possible fault and diagnostic assessments of the issue.</p> <p>Through the asking of appropriate questions, including:</p> <ul style="list-style-type: none"> <li>• Is the fault at a single radiator?</li> <li>• How frequent is the fault?</li> <li>• Do you have hot water?</li> </ul> <p>By expanding on the customer responses this allowed the candidate to make some judgments and trace the fault to the appropriate component quickly and confidently reassuring the customer at all times.</p> <p>The candidate selected an appropriate repair method and was focused and methodical in their approach to the maintenance repair carrying out the task confidently explained the process that they would carry out in good time and no damage to customer property.</p>

<b>Task</b>	<b>Notes</b> – <i>detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.</i>
Fault rectification	<p>Candidate implemented all the health and safety preparations required to take care of components and customer property, ensuring warning notices were in place as appropriate.</p> <p>Candidate follows a methodical and logical sequence, safely isolating the system and disposing of the waste water correctly, prior to selecting the correct tools to remove and replace the defective component.</p> <p>The candidate completed the repair efficiently without error and in good time, checking the completed repair.</p>

<b>Assessor signature</b>	<b>Date</b>
Assessor A	31/01/2021

## Photographic evidence

Results of tool usage.

**Photograph 14**



Component fitted correctly with no signs of tool marks from installation of the replacement component.

Sequence of photos which show the replacing and removal of the faulty component, and reinstallation of the new component.

**Photograph 15**



Loosening of faulty component.

**Photograph 16**



Removal of faulty component.

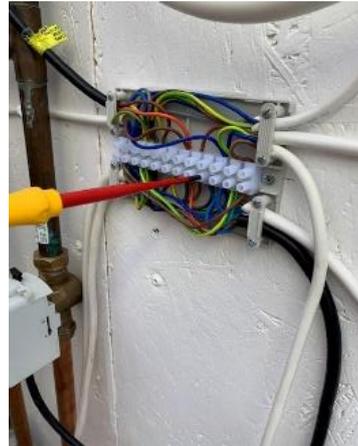
**Photograph 17**



**Photograph 18**



**Photograph 19**



Replacement of component.

System on completion of all works.

**Photograph 20**



Repair completed and work area left tidy.

## Commentary

The candidate displayed confidence when carrying out the discussion with customer, ensuring eye contact and positive interaction and body language throughout the discussion.

The candidate asked relevant questions to the customer and was able to determine the cause of the fault, with confidence and efficiency, demonstrating an excellent knowledge and understanding of the operating principles/ service requirements of the heating system/ appliance.

The candidate demonstrates a thorough understanding of the methods and techniques used to diagnose faults on heating systems/ components and the diagnosis of the fault followed a logical sequence.

The candidate shows excellent understanding of the techniques used to repair/ rectify faults in relation to the component that has been identified as being faulty.

The fault repair tasks followed a methodical order and is carried out confidently/ independently and free from errors.

The candidate is able to select the correct tools for the task. The use of tools is excellent and re-installed components/ pipework is aesthetically pleasing.

The T Level is a qualification approved and managed by the Institute for Apprenticeships and Technical Education.

Copyright in this document belongs to, and is used under licence from, the Institute for Apprenticeships and Technical Education, © 2020. 'T-LEVELS' is a registered trademark of the Department for Education. 'T Level' is a registered trademark of the Institute for Apprenticeships and Technical Education. 'Institute for Apprenticeships & Technical Education' and logo are registered trademarks of the Institute for Apprenticeships and Technical Education.

Every effort has been made to ensure that the information contained in this publication is true and correct at time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time.

City & Guilds cannot accept responsibility for any loss or damage arising from the use of information in this publication. The City & Guilds of London Institute. All rights reserved. City & Guilds is a trademark of the City & Guilds of London Institute, a charity established to promote education and training registered in England & Wales (312832) and Scotland (SC039576).5-6 Giltspur Street, London, EC1A 9DE.