T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Building Services Engineering for Construction

8710-355 Heating Engineering

Grade Standard Exemplification Material

Pass - Summer 2023

City & Guilds | eal

Contents

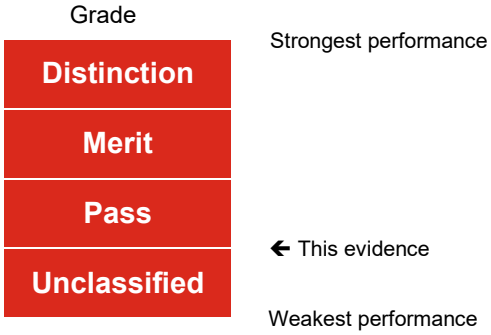
Introduction

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 pass 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 pass standard (threshold 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 pass 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 centre assessors. This was evidence that was captured as part of the assessment and then internally marked by the centre 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 pass grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than pass grade).

Grade descriptors

To achieve a pass (threshold competence), a candidate will be able to:

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

Demonstrate the adequate technical skills in cutting, bending, fixing pipework and installing components that is in line with industry standards.

Interpret information, demonstrate planning, assess risk and follow safe working methods when applying practical skills to an acceptable standard as recognised by industry.

Demonstrate basic knowledge and understanding of the principles and processes required for heating engineering.

Work safely showing an understanding in the selection and use of tools and equipment and demonstrate a basic awareness of straightforward preparation and application processes.

Attempt some complex tasks and the level of performance mostly meets an acceptable level.

Identify causes of heating faults and have some knowledge and skills in how to rectify them.

Mostly use industry terminology accurately in both written and verbal contexts.

Task 1 – Planning the Installation

Assessment number (eg 1234-033)	8710-355
Assessment title	Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	1
Evidence title / description	Materials list Method statement Risk assessment Installation diagrams
Date submitted by candidate	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
Hi vis jacket	1
adjustable spanner	1
adjustable grips	1
22mm copper pipe 3m	3
15mm copper pipe 3m	2
knee pad	1
roll of unleaded solder	1
flux	1
heat proof mat	1
22mm pipe slicer	1
15mm pipe slicer	1
spirit level	1
pencil	1
munson ring clips	8
tape measure	1
impact drill	1
crosshead screwdriver	1
flathead screwdriver	1
15mm endfeed elbow	3
22mm endfeed elbow	3

pipe bender	1
guide for bender	1
ruler	1
wire cutters	1
box of woodscrews	1
laser level	1
dust sheet	1
hose pipe	1
bucket	1
wire wool	1
2 port valve	2
copper end feed 22mm tee	5
drain valve	2
22mm – 15mm reducer	5

Completed method statement

Firstly, when I enter the workspace I will start to mark where I will be placing my clips, this is so when I go to install the pipework, it is much easier to get the pipe in the correct position and so that it is level. After I have marked out the clips I will measure out the length of pipe I need to cut for the first pipe. once cut to measurement I will put the pipe in with the 2 port valve. I will then need to connect up the return pipe with the magna clean and put it in the clip. After this I will start on the longer bit of pipework, I will firstly connect the 2 port valve then passover the return pipe. Next, I will carry on that pipework along the wall, round the corner and into the top left of the radiator. I will then connect up the 15mm pipe that is cut off just past the corner by doing an offset into the bottom right of the radiator. Once I have got all this pipework in, I will flux all the fittings and solder them making sure I refer back to the risk assessment, making sure I am wearing suitable PPE and carrying it out in the safest manner possible.

Once all the pipework is installed and soldered, I will start the commissioning stage. First I will check if the solder has run all the way round the fitting to ensure no leaks when testing the system, I will also make sure all compressions are fully tightened. Once I am happy with everthing I will begin to fill the system whilst checking all the joints for leaks. I will fill the system to 1 bar of pressure and then do a temperature test to ensure it is the corrrect temperature making sure it is above 70 degrees. Next I will flush the system through to clean it out. Once all the commissioning is finished, I can then begin to decommission the system.

To begin with the decommission stage I will connect a hose pipe to the drain off valves and take the pipe to a drain ready for the system to be drained down. Before draining I will turn the boiler off and isolate the electrics to it. while decommissioning I will make sure to refer to the risk assessment so that it is being carried out safely, making sure I am not creating any slip hazards or trip hazards by keeping the workspace tidy and mopping up any water on the floor. Once drained I will begin to cut down the pipwork down into small pieces as close to the fittings as possible. Finally I will sand down the wall and fill in any holes made, once this has been done I will paint over the wall so it looks presentable.

Completed risk assessment

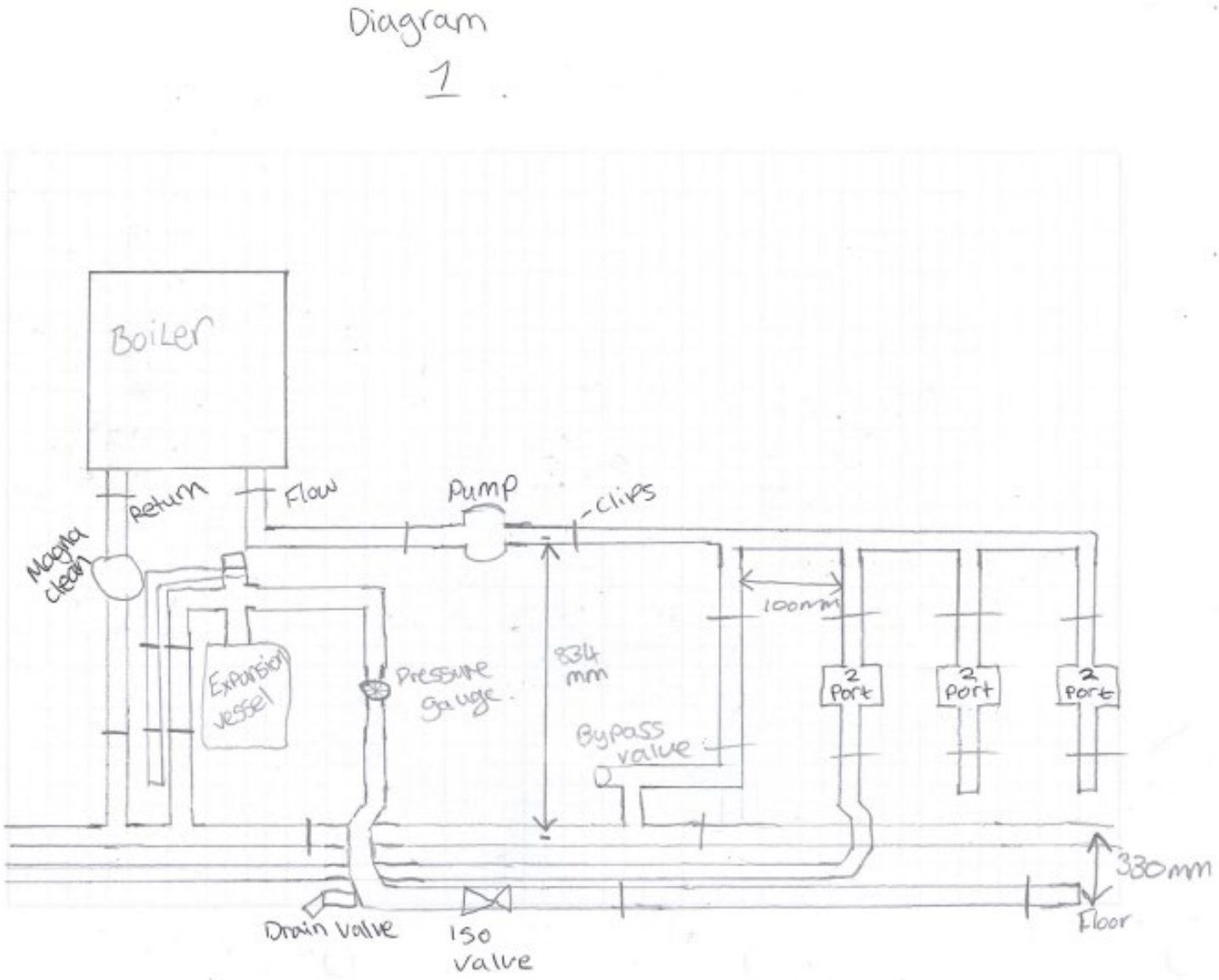
Activity: heating system install **Location: ---**	**Date: DD/MM/YY**

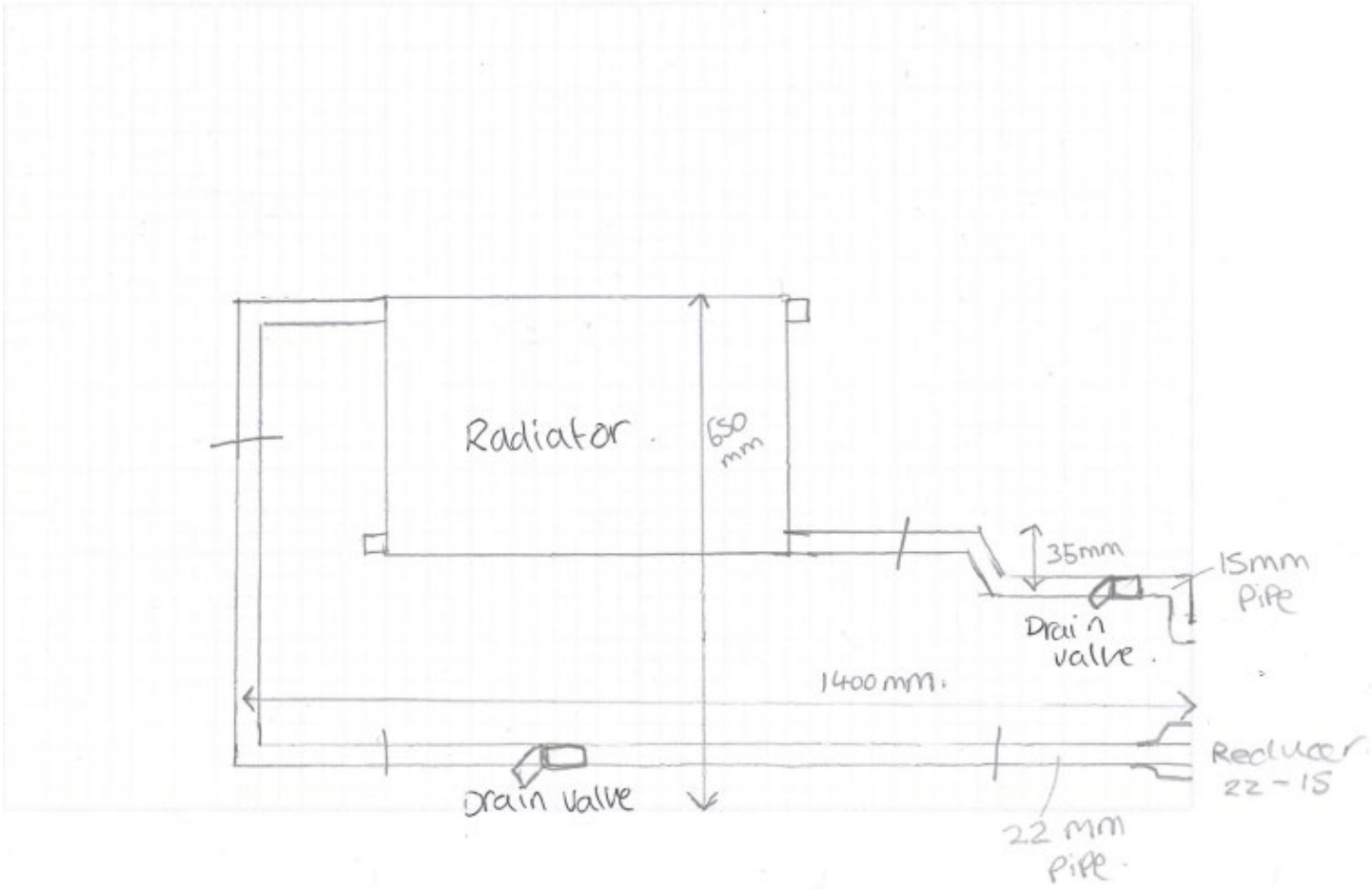
SEVERITY (S): Degree of harm which may be caused (including numbers affected) **1 Minor Injury 2 Major Injury 3 Fatality** **LIKELIHOOD (L): Probability that event will occur** **1 Remote 2 Possible 3 Likely**	**RISK RATING (RR): Severity x Likelihood** **1-2 Low** **3-5 Medium** **6-9 High**

Item No:	Activity	Hazard	Persons at Risk	Existing Controls (Mitigation)	S 1-3	L 1-3	RR	Are the Risks Controlled?
	Soldering							
1		Burns to skin	person soldering	competent training, correct ppe, coreect clothing	2	1	3	yes
2		hot flux spitting into eyes	person soldering	safety goggles, competent training, refer to COSHH	2	1	4	yes
3		Fire hazard	anyone within the building	use heat proof mat, have correct training, eliminate flammable material in area.	3	1	3	yes
	Decommissioning							
1		running hose pipe to drain	anyone in area or passing by	use of warning sign, keeping the hose tight to a wall.	3	1	3	yes
2		wet floor	anyone passing by	use wet floor sign, use bucket to minimise water on the floor, mop up asap if floor is wet.	3	1	3	yes

1	Hanging the radiator	injuring back	person carrying radiator	training on corrrect manual handling	2	2	4	yes
2		injury to feet	person carrying radiator	wear steel toe capped boots	2	1	2	yes
1	wiring the 2 port valves	electricution	person doing the wiring	training on electrics, follow safe isolation procedure	3	1	3	yes

Installation diagrams




Radiator
650 mm
35mm
15mm Pipe
Drain valve
1400 mm.
Reducer 22 - 15
Drain valve
22 mm Pipe

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)

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

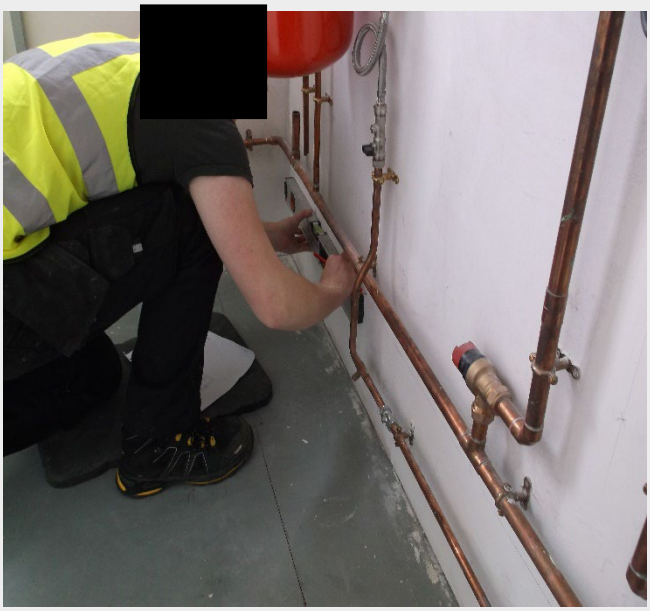
Provider name	<provider name>
City & Guilds Provider No.	999999a

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.

Assessment Themes	Assessor observation notes
Health and safety • Risk assessment • Risk mitigation • Harm and probability factors • Adherence to health and safety	Risk assessment covers all areas but is limited in detail. Some of the matrix calculations are inaccurate and placing some areas into medium risk rating with mitigation. Some reference to industry standards and COSHH.

Design and planning (documents) • Quality of documentation • Adherence to brief	Method statement covers all stages of the task. Method statement written in detail with references to the risk assessment covering PPE. Commissioning is basic and does not cover all areas required for commissioning a new installation. Decommissioning doesn't cover all areas but does reference the risk assessment regarding spills and trip hazards. Method does not mention recycling of materials or safe storage. The material list covers most areas, there are some omissions to the tool list including Blow torch, electrical test equipment and tools used for commissioning. There are tools or materials listed for making good to the building fabric. The magnetic filter was also missing from the list.
Design and planning (drawings and diagrams) • Accuracy • Positioning	Design drawing is clear and shows all components in the correct positions Design drawings have dimensions shown and position of the pipe clips. Drawings have been drawn to a good industry standard follows the design brief
Systems and components (installation) • Marking out • Measurements • Sequencing • Tolerances • Tools • Skills	9/05/23 9.20. <first name> has read the brief and verbal brief from the assessor before commencing setting out the work area, <first name> has correct PPE for the task and is using a kneeling pad. <first name> is referencing his design drawing to set out the work on the walls using pencil.  Task 1 Photo ref 1. Marking out walls using level and pencil. <first name> has marked out the pipework at 80mm centres not to the brief. Assessor asked <first name> regarding the pipe centres and <first name>

	thought the brief was pipe centres to be within 100mm, <first name> will rectify the setting out after morning break 10.30 to 11.00 <first name> has adjusted the setting out to give pipe centres of 100mm. There are many lines on the wall surfaces.  Task 1 Photo ref 2 . Heavy marking of walls due to inaccuracies
Systems and components (decommissioning) • Sequencing • Disposal • Waste removal • Techniques and finish	<first name> correctly referenced health and safety for the task identifying water spillage and trip hazards. No mention of safe storage or recycling of materials. With repairing the building fabric no mention of appropriate PPE or ventilation requirements.

Any other aspects

Internal assessor signature	**Date**
X	DD/MM/YY

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

Assessment number (eg 1234-033)	8710-355
Assessment title	Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2
Evidence title / description	Commissioning record
Date submitted by candidate	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	---
Engineer's Name	<first name><surname>
Date	DD/MM/YY
Boiler Manufacturer	Worcester
Model	Greenstar 15RI
Serial Number	55704580002857716130153
Rating in kW and SEDBUK	15kw SEDBUK rated A
Type of system	Sealed
Type of control system	S plan plus
Type of cylinder installed	Unvented
TRVs fitted	Yes
Automatic bypass fitted	Yes
Condensate drain fitted as per manufacturer recommendations	Yes

Commissioning Information	
Has the system been flushed with a cleaning agent	Yes
What cleaning agent was used?	Adey MC3plus
Has inhibitor been added to the system	Yes
What inhibitor was added to the system?	Adey MC1
Boiler flow temperature	60 degrees Celsius
Boiler return temperature	57 degrees Celsius

Hot water temperature at nearest outlet	60.3 degrees Celsius
Hot water flow rate at the nearest outlet	11 litres per min
Does the system comply with current regulations	Yes
Has the system been installed and commissioned in compliance with manufacturer instructions	Yes
Have instruction been left with the customer and have they received a demonstration of system controls	Yes

Candidate signature X	**Date DD/MM/YY**

Commissioning checklist:

- Visual inspection which includes checking tightness on compression fittings, checking soldering and checking it meets industry standard.
- Water tightness test to check there are no leaks.
- Pressure test to a pressure at least 30% greater than the working pressure.
- System flushing and cleaning
- System filling and venting
- Frost precautions
- Operational checks
- Static completion records
- Balancing water flow rates
- Adjusting of controls
- Heat performance test.

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)

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

Provider name	<provider name>
City & Guilds Provider No.	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

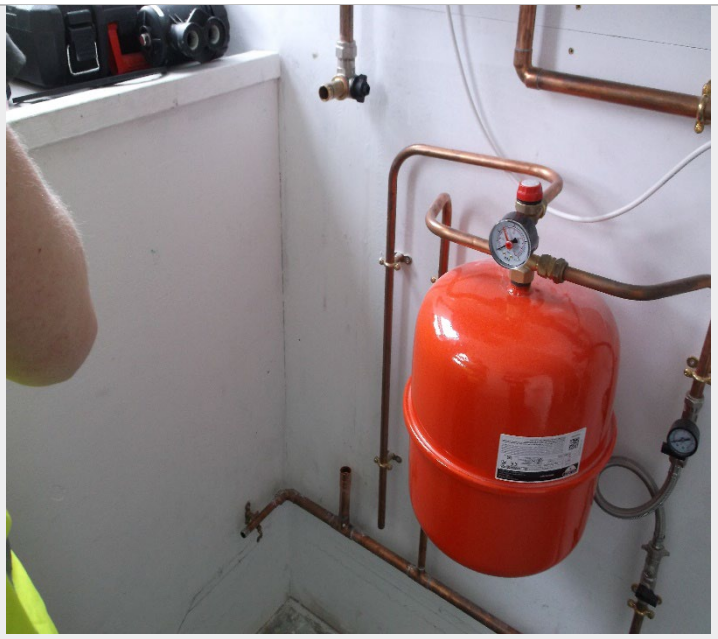
Record observation notes below to inform internal marking and external moderation. Notes must be detailed, accurate and differentiating which use terminology from the mark grid along with specific examples observed. Notes must identify areas of strength and weakness, distinguish between different qualities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

Assessment theme	Assessor observation notes
Health and safety • Risk assessment • Risk mitigation • Harm and probability factors • Adherence to health and safety	9/05/23 11.15 <first name> has started the installation work wearing the correct PPE. Safety boots, high visibility vest and has gloves and glasses when required. <first name> worked safely throughout the session. <first name> used a kneeling pad throughout the installation works. Risk assessment covers most areas with matrix accurate in most areas. During the installation <first name> adhered to the risk assessment-controlled risks.
Systems and components (installation) • Marking out • Measurements • Sequencing	<first name> started the installation connecting the return to the boiler incorporating the new magnetic filter. Assessor guidance given on how to remove the filter from the isolation valves, <first name> installed the Magnetic filter and soldered a 22mm coupling.

- Tolerances
- Tools
- Skills

Systems and components (decommissioning)

- Sequencing
- Disposal
- Waste removal
- Techniques and finish



Task 2 Photo ref 1. Installing the magnetic filter.

<first name> cleaned and prepared the joint correctly. <first name> soldered the coupling using the blow torch in a controlled confident way. <first name> used a heat mat to protect the building fabric.

Task 2 Photo ref 2. Magnetic filter installed without any clips.

<first name> installed the zones valves for the underfloor heating zone and new LST radiator zone. The flow pipe for the underfloor heating was connected using a 22mm compression coupling.

Task 2 Photo ref 3. Installation of the 22mm zone valves and pipework.

<first name> made good progress in the first session on the installation before stopping for lunch break at 1.00 pm

<first name> dressed the LST radiator with the valves supplied with the LST radiator.

Task 2 Photo ref 4. TRV and lock shield valves installed with air vent and plug fitted. <first name> used PTFE for the male iron taper threads.

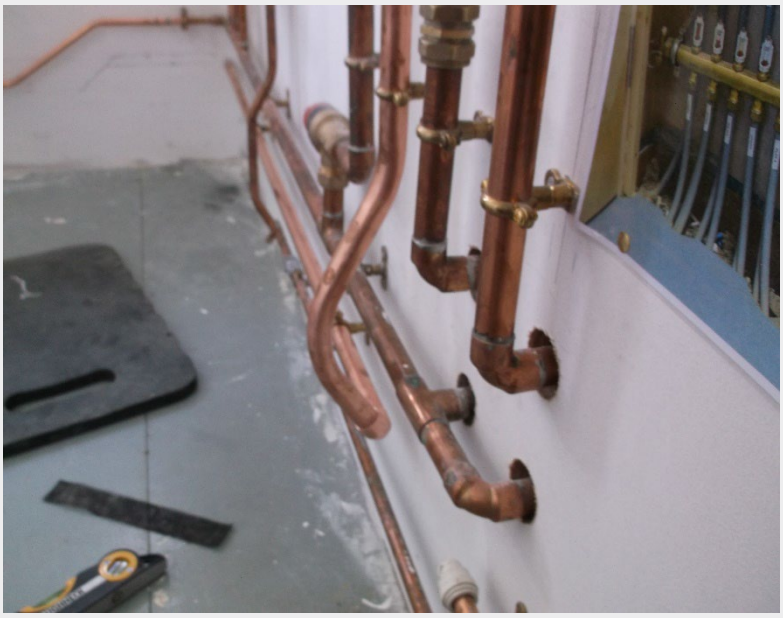
<first name> fabricated the offset bend for the return pipework on the LST. <first name> fabricated the bend confidently to measurement of 150mm centre to centre to allow the return to pass under the LST radiator cover. <first name> fitted a 15mm tee and drain valve on the lowest point.

<first name> is preparing the copper pipework for soldering as its fabricated which will help him progress at a good rate. <first name> removed the washer from the drain valve before preparing for soldering.

Task 2 Photo ref 5. Evidence of <first name> soldering safely with all precautions in place. Mechanical extractor in use with windows opened.

<first name> fabricated the 22mm passover with a degree of confidence bending using measurements. The passover was slightly larger than required but acceptable bend to a moderate industry standard. <first name> installed the 22mm horizontal section of the 22mm flow to LST radiator using Munson clips spaced within the 600mm design brief.

<first name> has cut the passover bend and installed connecting to the 22mm zone valve. <first name> has cleaned, fluxed and prepared the capillary joints ready for soldering. <first name> soldered a 22mm coupling on the bench taking all necessary precautions.



Task 2 Photo ref 6. Passover bend installed ready for soldering.

10/05/2023 9.15

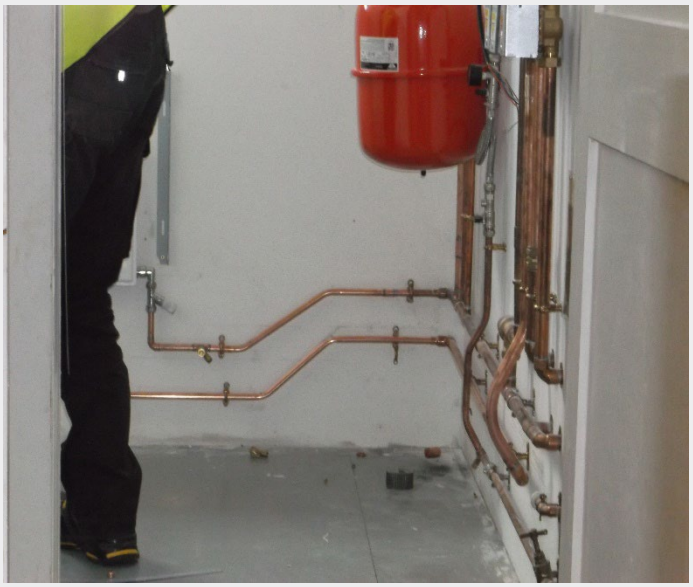
<first name> started the session wearing the correct PPE. <first name> set out the second offset bend for the LST radiator flow.

<first name> is installing the Munson ring clips for the flow pipe. The clips are not aligned with the clips on the return pipework.

<first name> fabricated the offset bend for the LST flow using measurements and sliding bevel to create the same angle as the return offset.

Task 2 Photo ref 7. <first name> fabricating the 15mm Offset bend for LST radiator flow pipe.

<first name>’s first attempt wasn’t the same as the return offset, so <first name> is attempting a second bend. Assessor guidance given as <first name> was struggling with the concept of the bends being identical pipe centres. <first name> has measured the pipe centres and fabricated the new bend at 120mm centres.



Task 2 Photo ref 8. The second offset bend is accurate to the 100mm centres, but accuracy of the angles is not identical.

<first name> cleaned and prepared the final installation pipework for soldering; <first name> has installed a drain valve on the lowest section of the installation. <first name> soldered the capillary joints using mechanical extractor and windows opened for ventilation. All safety precautions in place with heat mat for protection of the building structure.

<first name> cleaned off the flux residue from the pipework using a damp cloth and cleaning strips.

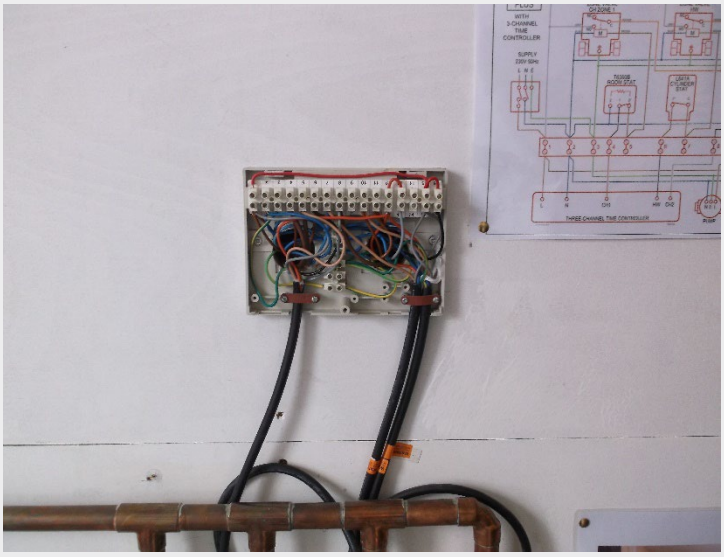
<first name> wired the zone valve into the wiring centre. <first name> carried out a safe isolation of the electrical supply. The electrical supply was isolated at the switched fuse spur and the fuse was removed.

<first name> carried electrical test on the test equipment to prove it was working correctly before carrying out testing in the wiring centre. <first name> tested Line to Neutral, Neutral to Earth and Line to Earth. Assessor observed throughout and concluded the electrical supply was safe. <first name> wired the zone valve as per the wiring diagram.

Task 2 Photo ref 14. Safe isolation testing of the wiring centre.

The installation is completed ready for commissioning.

Installation evidence.



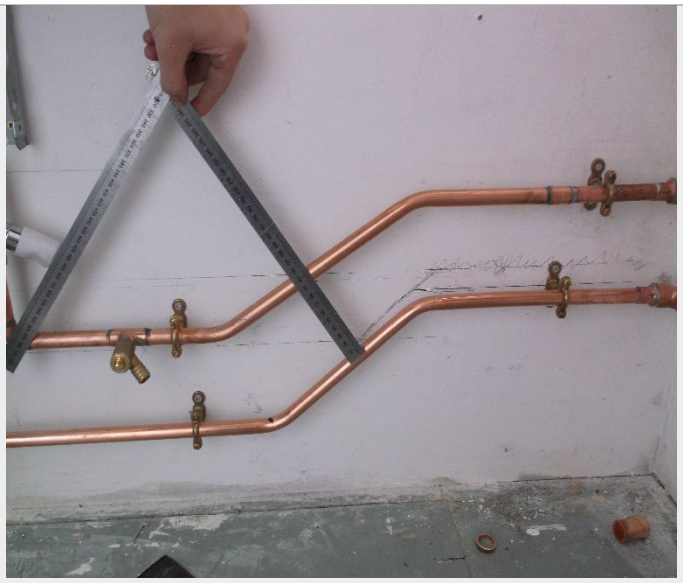
Task 2 Photo ref 15. Wiring completed and assessor checked. Wire clamped and wires in correct terminals.

Task 2 Photo ref 9. Soldering capillary Joints. Lines shown on walls from setting out .

Task 2 Photo ref 10. Radiator pipework completed.

Task 2 Photo ref 11. Pipe centres to design brief 100mm centres. Munson clips not aligned.

Task 2 Photo ref 12. Pipe centres as to design brief 100 mm centres.

	 Task 2 Photo ref 13. Offset bends not parallel. 100mm centres in mid-point range from 85mm to 110mm across the length of offsets. Munson clips not aligned with each other.
Reports and information • Quality of documentation	The commissioning checklist covers some areas of commissioning the heating system. <first name> has used bullet points outlining the key areas of the task but with limited detail. Most areas of the checklist could have been expanded to demonstrate good under pinning knowledge. The Commissioning sheet was filled out accurately to the data collected during the commissioning procedure.
Inspecting and testing of systems and components • Commissioning tests • Commissioning checks • Reference to / follows manufacturer's instructions	<first name> completed the written checklist for commissioning the installation. <first name> checked all joints visually and tightened all compression joints using the correct tools. <first name> has closed all air vents ready for filling. <first name> filled the system to a pressure of 1 bar and left to stabilise for 10 minutes. <first name> had 2 small leaks on compression joints which was dealt with my tightening. Both leaks were sound. <first name> then pressurized the system to 1.5 Bar for a test duration of 30 minutes.

Task 2 Photo ref 16. System filled to 1.5 Bar test pressure

After completion of the soundness test of the installation <first name> drained the system to flush out,

Task 2 Photo ref 17. Draining system with hose pipe to lowest drain in floor gully

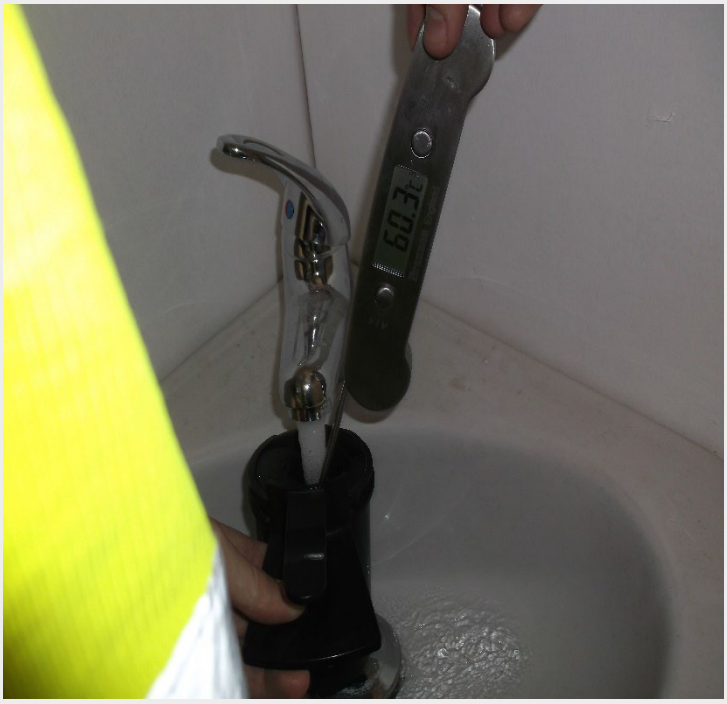
Hose was run across floor safely with Aboard signage

Task 2 Photo ref 18. Hose pipe run across floor to drain safely.

<first name> prepared to refill the system by closing all air vents and closing off the drain valves. System cleaner was added to the system via the Magnetic filter

The system was filled to 1 Bar and air cleared at all air vents. <first name> switched to boiler on and carried out a heat test and carried out the commissioning checks as per the commissioning sheet.

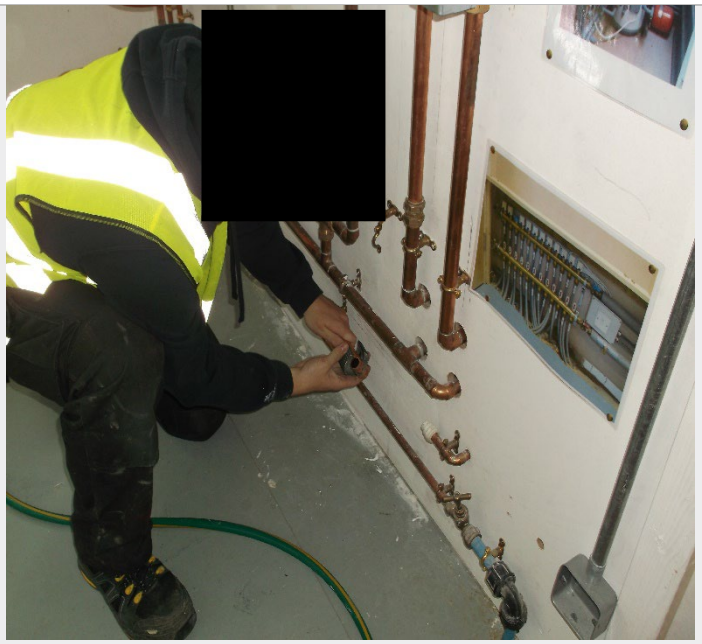
<first name> checked the water temperature at the nearest point and recorded temperature and flow rate and recorded on the commissioning sheet.



Task 2 Photo Ref 19. Hot water temperature and flow rate.

<first name> recorded flow and return temperatures of the primary pipework and recorded on the commissioning sheet.

	Task 2 Photo ref 20. Flow and return temperature primary pipework. <first name> fitted the LST radiator cover connecting the TRV to the remote head fitted in casing. All functional controls were checked including the operation of the TRV and auto bypass valve. Assessor questions regarding commissioning showed basic heating control knowledge.  Task 2 Photo ref 21. LST cover fitted with TRV head Connected and tested. <first name> drained the system once all checks were completed and flushed out the system to remove the system cleaner. <first name> refilled the system to 1 Bar adding corrosion inhibitor via the magnetic filter. The system was vented at the highest points and system heat tested, Decommission. <first name> isolated the heating system at the switched fused spur and removed the fuse from the holder. <first name> drained the system as per the flushing procedure with hose run across floor to drain with safety precautions adhered to.

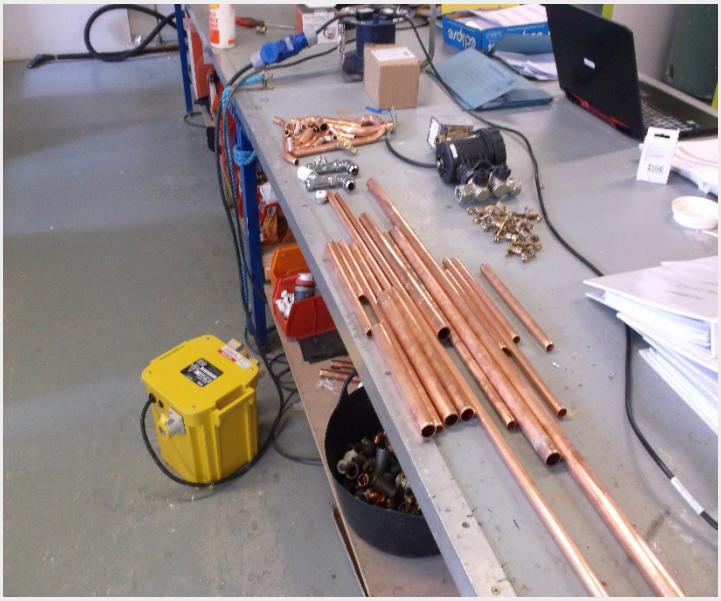


Task 2 Photo ref 22. System drained down <first name> removing pipework and components.

<first name> removed all components methodically and stored away safely.

<first name> contained most water spillage from removing pipework and had access to a mop and bucket when required.

All pipework was removed in manageable lengths, Lengths were kept for re use and all other lengths and soldered fittings were separated for re cycling



Task 2 Photo ref 23. All pipe and components removed and sorted for recycling and re use.

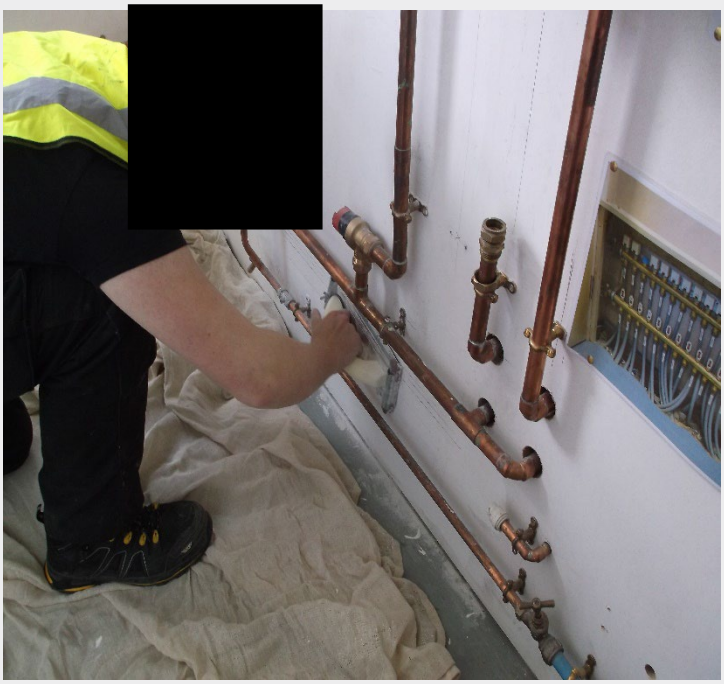
Task 2 Photo ref 24. Work area cleared ready for making good to the building fabric.

11/05/23. 10.30

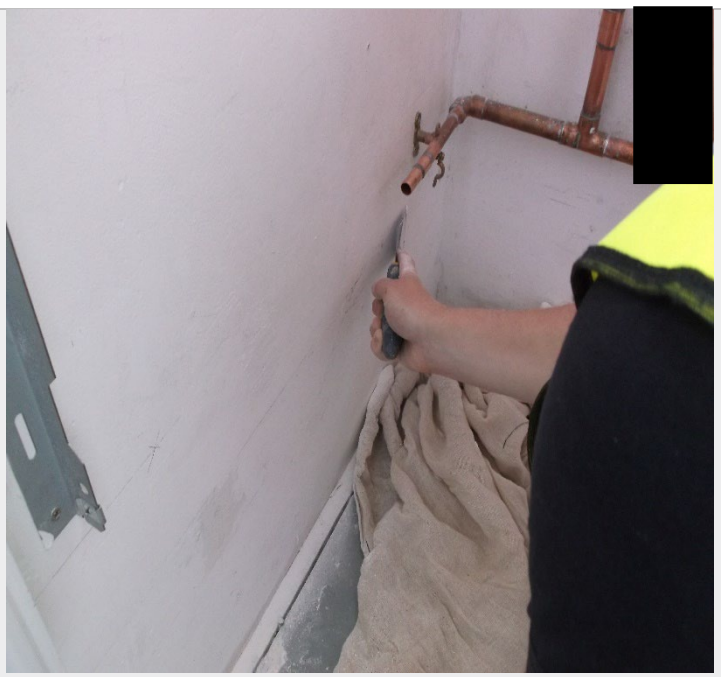
<first name> started the session with a brief from the assessor detailing that task 2 had 2 hours left for completion.

<first name> wore correct PPE for the task. Safety boots, high visibility vest. Glasses, gloves and a face mask.

<first name> prepared the area with a dust sheet. <first name> sanded the walls in preparation for filling all holes and disturbed wall areas.



Task 2 Photo Ref 25. Sanding the walls before filling.



Task 2 Photo ref 26. Filing the holes with decorating caulk.

Task 2 Photo ref 27. Painting the disturbed walls with a paint brush.

The walls were painted using Emulsion and a paint brush, 2 coats were applied to cover all filled holes and pencil lines.

<first name> removed the dust sheet and folded away tidily. The floor area was hoovered, and all tools and equipment put away in correct positions.

	 Task 2 Photo ref 28. Wall areas painted and area clean and tidy. Task 2 completed, all paint equipment cleared away and washed out.
Handover and communication • Customer Care • Demonstration of system • Communication	<first name> Handed over to the customer/ assessor in a confident manor answering assessor questions to a good industry standard. <first name> demonstrated a good knowledge of most components and how the system operated. Good knowledge of the TRV and LST radiator was demonstrated by <first name>. Knowledge of the Auto bypass valve was limited but generally he grasped the concept of clearing heat from the boiler heat exchanger. The communication skills were to a good standard and customer care demonstrated by a clean, tidy work area left after installation was completed.

Any other aspects

Internal assessor signature	**Date**
X	DD/MM/YY

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

Task 3 – Carry out maintenance

Assessment number (eg 1234-033)	8710-355
Assessment title	Occupational specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3
Evidence title / description	Written report of the maintenance activity
Date submitted by candidate	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

Fault: Central heating not working
Description of fault diagnosis There was no heat getting to the radiators however the pipework was hot meaning the water must not be making it to the radiators. The first thing I did was check to 2 port valve on the central heating to check if that was working, and by going to the thermostat and adjusting it I could see that the 2 port valve was opening and closing fine so this wasn't the problem. I then figured this would be a problem with the pump as the purpose of it is to get the water moving around the system. Firstly, I wanted to check that there was power going to the pump, so I turned the switch and opened the case. I then checked my testing equipment was working and then turned on the switch and tested to see if there was power. Possible solutions Faulty 2 port valve Faulty pump Faulty lead to pump, so no power to it Actions taken to rectify fault I found that there was power going to the pump which led me to believe the pump is faulty. This meant it would need changing so I turned off the valves either side of the existing pump, removed it whilst having a dust sheet and bucket beneath to catch any water to ensure no damage is being done. Once the pump was removed, I then fitted the new one, opened up the valves and let the water run through to check for any leaks. I then turned the electrics back on and everything started to work with the radiators eventually heating up.

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)

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

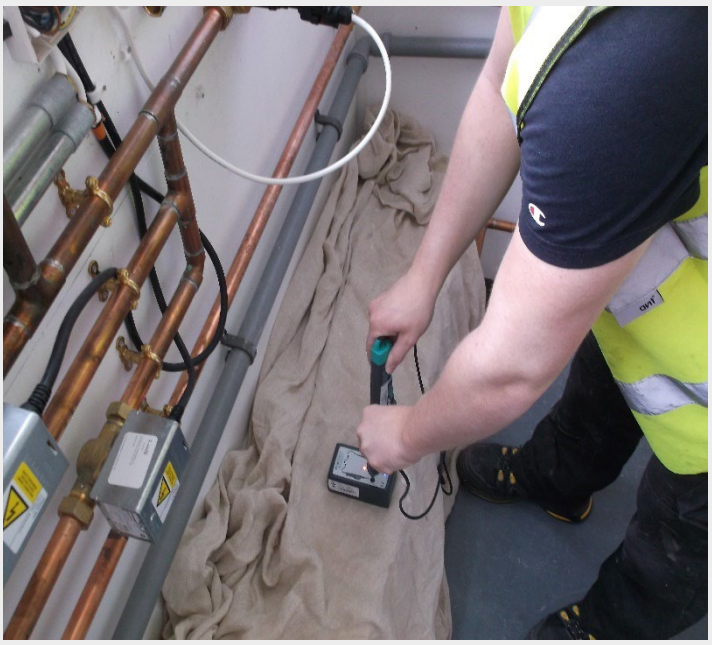
Provider name	<provider name>
City & Guilds Provider No.	999999a

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
Health and safety • Risk assessment • Risk mitigation • Harm and probability factors • Adherence to health and safety	<first name> carried a verbal risk assessment with assessor before starting the task. <first name> identified the risks as being: Electrocution, working on the wiring of the central heating. Possibly dropping components and tools on persons and property Flooding damage when removing components Scalding from possible hot water pipework.
Reports and information • Quality of documentation	The fault diagnosis was written accurately with good justification to the findings Possible solutions had minor inaccuracies to the fault diagnosed. Actions taken were correct for the diagnosis but lacked detail in how the repair was carried out.
Handover and communication • Customer Care • Demonstration of system	<first name> handed over to the customer/Assessor confidently demonstrating that he understood how the repair was diagnosed and rectified. Assessor questions prompted good clear answer with good communication skills.

• Communication	<first name> discussed in detail that the circulator was changed and tested, clearing and venting air from the system and telling the customer to check the pressure gauge to check that it remains at 1 bar.
Working with faults • Systematically / logically • Knowledge of fault-finding techniques • Reference to / follows manufacturer's instructions • Fault rectification • Efficiency / accuracy • Use of tools	<first name> required assessor assistance in diagnosing the fault but had a good understanding of the process but needed prompts to work out the correct way to prove the faulty component. <first name> once prompted knew he had to test the electrical supply to the circulator. <first name> correctly used the Electrical test equipment in a safe confident manor. <first name> removed the wiring centre after switching off the power supply. <first name> checked the test equipment at the proving unit before commencing electrical tests.  Task 3 Photo ref 1. Proving the electrical test equipment before carrying out any checks. Once the electrical test equipment was proved <first name> carried out the fault diagnosis on the wiring centre, <first name> checked the line supply to the circulator and proved there was 230V at the circulator Line supply, <first name> concluded the circulator was faulty.

Task 3 Photo ref 2. Proving the Circulator line supply 230V

<first name> diagnosed the faulty circulator and carried out a safe isolation procedure by switching off the switched fused spur next to boiler. The fuse was removed from the holder and a warning sign placed at the switch.

Task 3 Photo ref 3. Safe isolation of the heating system. Fuse removed and warning sign above switched fuse spur.

<first name> proceeded to remove the faulty circulator; <first name> isolated the circulator at the maintenance valves using a small adjustable spanner. <first name> took precautions as the pipework was warm so wore gloves. <first name> removed the circulator at the brass unions and caught any spills in a water container.

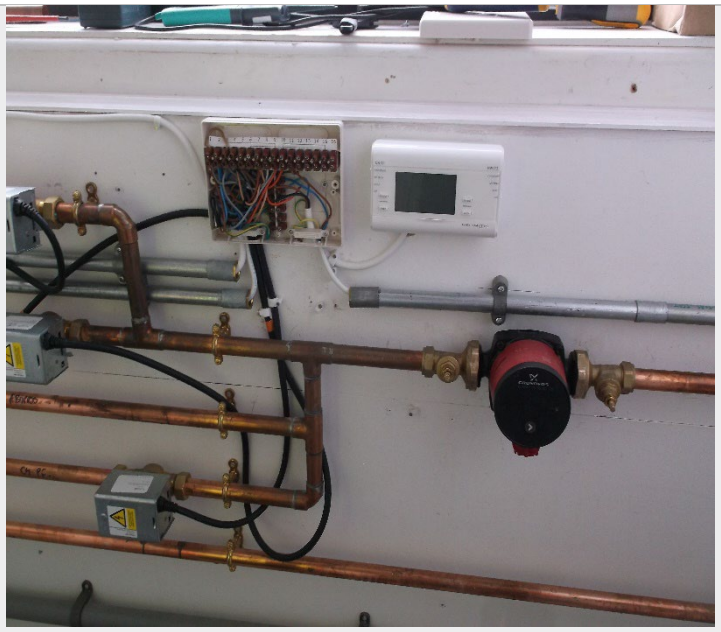
Task 3 Photo ref 4. Circulator removed after isolation at valves.

Assessor guidance given on the use of the Earth continuity bond clamps as <first name> wasn't aware they were required for the task.

<first name> checked the brass unions and rubber seals each side of the circulator. <first name> chose the correct replacement circulator and installed.

Task 3 Photo ref 5. Circulator installed with correct direction of flow. The valves were opened, and joints visually checked for leaks, <first name> checked the system pressure gauge and was happy the gauge read 1 bar.

<first name> removed the existing circulator cable from the wiring centre and re wired the new circulator with a new circulator plug.



Task 3 Photo Ref 6. Circulator cable and plug removed.

Task 3 Photo ref 7. Circulator installed, new cable and plug wired to the wiring centre and electrical supply restored.

<first name> carried out a performance test of the new circulator checking functional controls of the heating and hot water circuits, <first name> vented air at the highest points of the system. The circulator was left in the mid-range position. Assessor prompted questions on how you would know the system was working correctly and how to check. <first name> showed good knowledge of system balancing.

Any other aspects

Internal assessor signature	Date
X_____	DD/MM/YY

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

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

T: 0300 303 53 52

E: **technicals.quality@cityandguilds.com**

W: **http://www.cityandguilds.com/tlevels**

Web chat available **here**.

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