T-Level Technical Qualification in Building Services Engineering for Construction - Heating Engineering

Centre Standardisation Materials

Version 1.1
Last modified 19-January-2023
For external use

Contents

Introduction

Heating engineering (8710-35/36) (355)

These standardisation materials have been produced to support centre assessors when marking the Occupational Specialism assessment.

The materials are produced to support staff in the process of marking, including how to effectively use marking grids to mark using assessment themes.

The Occupational Specialism assessments for the T Level in Building Services Engineering are externally set summative assessments which are internally marked by assessors. It is the centre's responsibility to ensure candidate's work is marked in a standard way across the centre, using the specified marking grids, in order to rank performance on a single mark scale.

The marking materials must be considered alongside the Technical Qualification Occupational Specialism assessment guide.

It is recommended that all assessors, including any unlikely to mark, are included in early discussions around the use of the marking grids, as all assessors should understand the basis of marking. This is because it could shape their teaching by helping candidates practise, bringing their skills and knowledge together to complete a problem, and helping them learn to explain and justify their choices in terms of subject knowledge in preparation for summative assessment.

Assessors must study the Technical Qualification Occupational Specialism assessment guide which provides detailed information about the assessment themes and the marking grids, to ensure they are clear about the different assessment themes and how they may show up in evidence across the range of tasks.

If there is more than one assessor carrying out marking at the centre, this process should be carried out as part of a group activity to ensure markers are clear and in agreement about what sorts of evidence are relevant for assessment and which assessment theme they fit into.

The following materials should form the basis for pre-standardisation and discussion could take place using evidence from trial runs/formative assessment activities. Standardisation should also take place using the evidence from the actual assignment set for that year, so along with utilising this tool, please ensure activities surrounding the live assignment also take place.

Thank you for accessing these support materials. Please note that the Practical Observation form has been updated since the publication of these materials. The Practical Observation form included in the live assessment materials is the version that must be used when assessing the Occupational Specialism.

Guide to marking the T Level Occupational Specialism Assessment – recording: link

Please review the accompanied recording to support standardisation activities.

Within this pack, you will find:

- Links to the assessment materials and relevant Guide Standard Exemplification Materials
- Links to the Sample Assessment Materials
- Exemplar candidate evidence from two candidates – Candidate A and Candidate B
- Guidance on the exemplar marking
- A partially completed candidate record form, reflecting marking of a number of the assessment themes within this assessment

Candidate A

2.1. Assessment details

This standardisation pack has been developed to reflect the requirements of the **Heating engineering – Sample** version. The assessment pack can be access on the City & Guilds website, here.

The evidence used for the exemplar marking in this pack is based on the **Guide Standard Exemplification materials** for this occupational specialism that can be located, here.

2.2. Task Overview

The Practical Assignment is based around a work-based scenario and is made up of three tasks:

Task 1 – Planning the installation

a) Plan the installation of the boiler, the S Plan heating system and the additional radiator in the garage conversion, following the client brief
b) Measure and mark out work area as detailed in your diagram

Task 2 – Installation, commissioning and decommissioning

a) Install the boiler, the S Plan heating system and the additional radiator in accordance with your drawing and as agreed by your assessor.
b) Connect the electrical supply to the boiler from a suitably supplied fused spur connection following the safe isolation procedure
c) Commission the system (pipework only) and handover to customer
d) Decommission the system

Task 3 – Carrying out maintenance

a) Discuss fault with customer, investigate and diagnose fault
b) Produce a written report of the maintenance activity
c) Repair and rectify fault

2.3. 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:

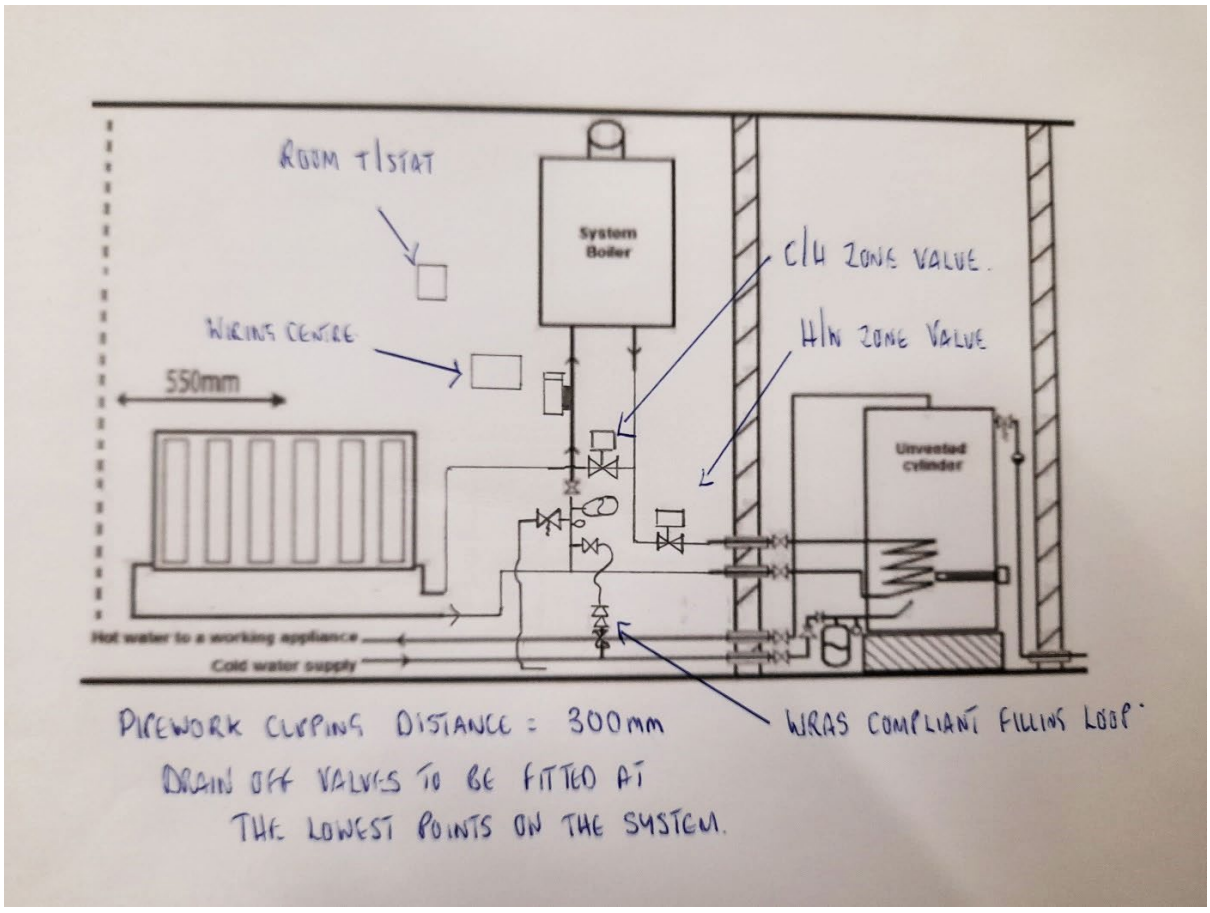
Measuring and marking out of proposed working area

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.**

2.3.1. Task 1 - Candidate evidence

1.1.1. Installation diagram



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

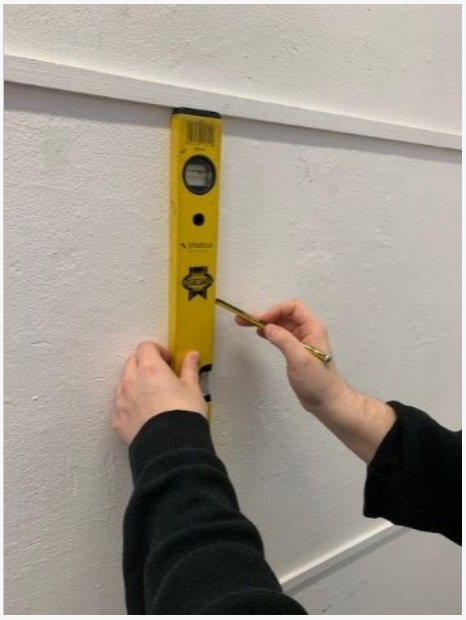
Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
City & Guilds	Systems and components (Installation)

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

Task	**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.*
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.

1.1.3. Task 1 - 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.

Evidence description	Photo
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.	

1.1.4. Risk assessment

This risk assessment may be modified by adding items only.

Activity: Installation of pipework **Location: Centre A**	**Date: xxxxxx** **Position: Candidate**
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?
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

Activity: Decommissioning **Location: Centre A**	**Date: xxxxxx** **Position: Candidate**
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?**
1	Hazardous waste	Potential for foul waste and contaminated pipework	Self	Correct use of PPE including gloves Wash hands carefully and	1	1	1	Yes

		from flux's or other waste materials		dispose of contaminate waste in suitable location to remove risk from contaminants				
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

Activity: Maintenance **Location: Centre A**	**Date: xxxxxx** **Position: Candidate**
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	R R	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

1.1.5. 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.

1.1.6. Material 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
FI 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
PPE	
Boiler suit/protective clothing	
Gloves	
Steel toe capped boots	

Goggles	

2.4. 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:
    - Safe isolation process
    - Installation of components
    - Commissioning
    - Handover to customer
    - Decommissioning

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

- Assessor observations:
    - Safe isolation process
    - Installation of components
    - 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 required:

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**

2.4.1. Task 2 - Candidate evidence

1.1.1. Practical Observation Form – Safe isolation

Assessment ID	**Qualification number**
8710-355	8710-36
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
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.

Task	**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.*
Safe isolation	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. Candidate correctly selected all the equipment required, including voltage indicator, lock off kit, correct signage. 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.

1.1.2. Practical Observation Form – Installation of components and pipework

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

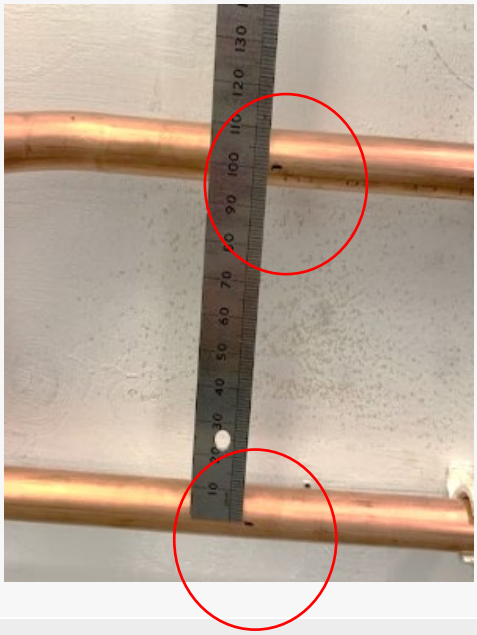
Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

Task	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.*
Installation of components	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. Candidate details any pre-existing marks or damage to the wall prior to marking out for their installation. Candidate set about the task in a highly organised manor and prefabricated lengths of pipework including bends to ensure accuracy, consistency and efficiency 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. 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. Candidate has effectively marked out and measured pipework to suitable lengths to carry out the installation, with no wastage of materials

	All tolerances met throughout the installation producing a piece of work that was aesthetically pleasing. All S Plan central heating components were installed and wired as per the manufacturer instructions. Magnetic filter has been correctly positioned and installed as per manufacturer instructions Candidate correctly selects and uses tools, resulting in no tooling marks to components. Pipework skills result in no wasted materials

1.1.3. Task 2 - Photographic evidence

Tolerances have been met for the measurement of pipework.

Evidence description	Photo
Photograph 3 Finished installation showing finished pipework and component positioning which demonstrates the aesthetics of the completed installation.	
Photograph 4a	

Photograph 4b

Photograph 5

Copper pipework installation

Pipework installed to the required tolerance (+/-2mm). Bends have been completed to a high standard with no signs of throating or rippling

Photograph 6

Pipework level

Pipework level and within tolerance (+/-2mm)

Photograph 7

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

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

Photograph 8

Results of tool usage

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

Photograph 9

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.

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.

Photograph 10

Use/type of clips

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

1.1.4. Practical Observation Form – Commissioning

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
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.

Task	**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.*
Commissioning	Candidate follows correct process for commissioning tests using manufactures instruction for the heating system to ensure no aspects of the commissioning had been omitted. 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. 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. Candidate completed commissioning records in line with industry requirements.

1.1.5. Practical Observation Form – Handover to customer

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
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.

Task	**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.*
Handover to customer	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. 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. Candidate provides detail of maintenance and service requirements for both installations. Candidate makes reference to manufactures instructions at relevant stages of the task.

1.1.6. Practical Observation Form – Decommissioning

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
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.

Task	**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.*
Decommissioning	Candidate follows a logical sequence for decommissioning. Candidate follows safe working practices throughout the duration of the task. Candidate removes fragile components first to limit risk of damage and where appropriate returned them into original packaging. 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. Candidate endeavoured 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.

1.1.7. Photographic evidence

Evidence description	Photo
Photograph 11 The system being drained down safely and economically to the correct location. Preparation for draining down: correct equipment and drain point used to drain down system pipework for decommissioning activities. Use of correct signage.	
Photograph 12 Decommissioning of pipework and components for the system installation. Pipework decommissioned correctly with consideration of recycling and reuse. Separation of clean/dirty copper.	
Photograph 13 The finish of the working area after decommissioning following filling and repainting of surfaces. No holes and marks evident following decommissioning of pipework and surface preparation.	

2.5. 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

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**

2.5.1. Task 3 - Candidate evidence

1.1.1. Writing a 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

1.1.7. Practical Observation Form – Fault diagnosis and fault rectification

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
City & Guilds	Working with faults/ Handover & communication

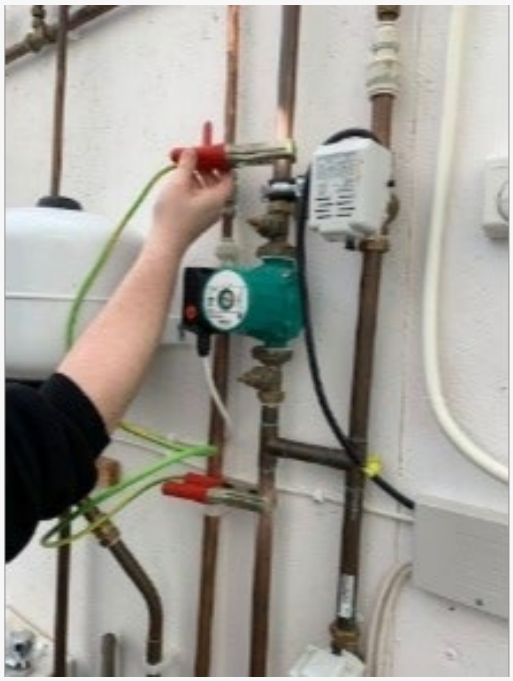
Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

Task	**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.*
Fault diagnosis and customer discussions	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. 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. Through the asking of appropriate questions, including: • Is the fault at a single radiator? • How frequent is the fault? • Do you have hot water? 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. 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.

Fault rectification	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. 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. The candidate completed the repair efficiently without error and in good time, checking the completed repair.

1.1.8. Task 3 - Photographic evidence

Tolerances have been met for the measurement of pipework.

Evidence description	Photo
Photograph 14 Results of tool usage. Component fitted correctly with no signs of tool marks from installation of the replacement component.	
Photograph 15 Sequence of photos which show the replacing and removal of the faulty component, and reinstallation of the new component. Loosening of faulty component.	

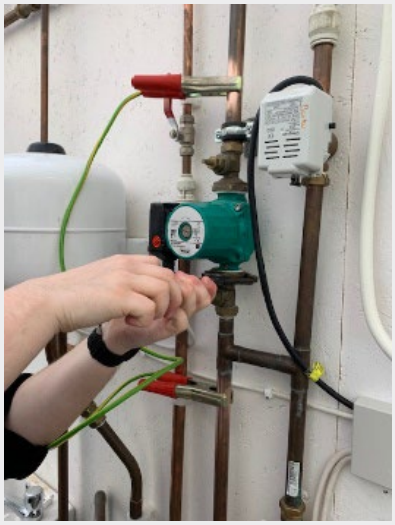
Photograph 16

Removal of faulty component.

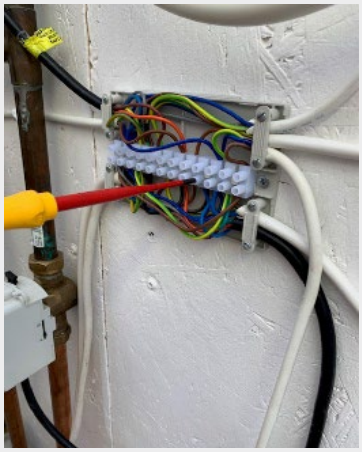
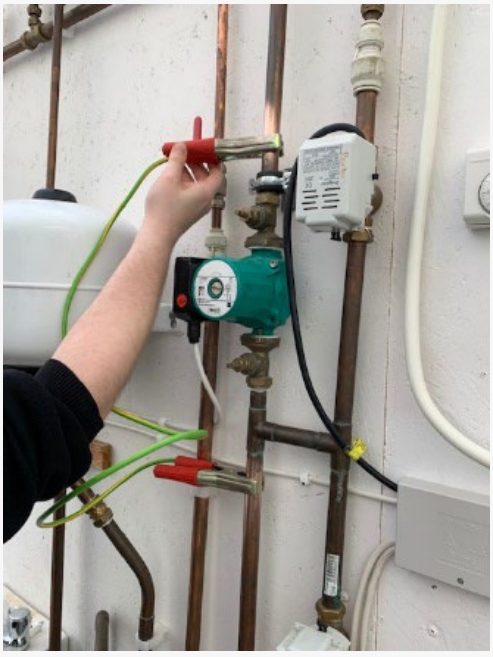
Photograph 17 to 19

Replacement of component.

17.



18.

	19. 
Photograph 20 System on completion of all works. Repair completed and work area left tidy.	

2.6. Guidance on the exemplar marking

Within this standardisation pack, a partially completed CRF form has been provided that outlines how an assessor has awarded marks against the candidate evidence for a number of the assessment themes.

For the purposes of these materials the Marking Grids used can be found in the Sample Assessment Materials here.

For exemplification purposes, an explanation of how the marker has determined the mark to be awarded is provided, this exemplary document showing

- How the marker has first considered the marking bands available and determined within which band the evidence best fits
- Subsequently, consideration within the determined band and justification for the mark to be awarded within that band.

2.7. Candidate Record Form (CRF) – Heating engineering (8710-35/36) (355)

Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Centre number**
City & Guilds	123456

Marker Notes – Please always refer to the relevant marking grid for guidance on allocating marks and make notes which describe the quality of the evidence and justification of marks. Expand boxes as required

Health and safety												
	Band 1				**Band 2**				**Band 3**			
	1	2	3	4	5	6	7	8	9	10	11	12
Band 3	Band justification *The candidate has demonstrated that they have exceeded the requirements of the middle marking band:* *Risk assessment is detailed and clearly identifies all of the associated risk factors.* *Risk mitigation methods are detailed and have been clearly identified for all potential risks. Potential for harm and probability factors have been identified throughout. Health and safety is followed during preparation and throughout tasks and all work completed safely.* *Risks and hazards that occur during the tasks are correctly mitigated against as they are arise.* *Therefore, the mark to be awarded sits within the upper marking band.*												
Mark 11	Mark justification *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.* *Due to the reasons outlined here –the response has been determined to be at the upper end of the highest marking band and a mark of 11 has been awarded.*											

Design and planning – Documents									
	Band 1			**Band 2**			**Band 3**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Band 3	**Band justification** *The candidate has demonstrated that they have exceeded the requirements of the middle marking band:* *Documents are thorough and demonstrates comprehensive technical knowledge, and the process is set out in a logical order. There is detail in how to perform tasks with clear reasoning that links to the assignment brief and tasks to justify choices made.* *All materials, quantities and PPE required to meet the brief have been identified with excellent consideration given to the aesthetics of the finished installation.* *Therefore, the mark to be awarded sits within the upper marking band.*								
Mark 8	**Mark justification** *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.* *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.* *Due to the reasons outlined here –the response has been determined to be in the upper marking band and a mark of 8 has been awarded.*								

<table>
<tr><td colspan="13">Working with faults</td></tr>
<tr><td></td><td colspan="4">Band 1</td><td colspan="4">Band 2</td><td colspan="4">Band 3</td></tr>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td>Band

3</td><td colspan="12">Band justification

The candidate has demonstrated that they have exceeded the requirements of the middle marking band:

Fault-finding techniques were carried out systematically and logically displaying accurate knowledge of fault-finding techniques.

Investigation and analysis of fault was detailed and logical.

Manufacturer’s instructions were followed at all appropriate stages during the fault diagnosis.

Rectification of fault follows a logical process and is completed efficiently and accurately with no mistakes.

Use of tools is excellent and completed on first attempt, resulting in a high-quality finish.

Therefore, the mark to be awarded sits within the upper marking band.</td></tr>
<tr><td>Mark

12</td><td colspan="12">Mark justification

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.

Due to the reasons outlined here –the response has been determined to be in the upper marking band and a mark of 12 has been awarded.</td></tr>
</table>

Internal assessor name	Date
Internal assessor signature	

Total mark
*/90

* Please Note that the Total Mark (90) applies to the full assignment including all Assessment Themes

Candidate B

3.1. Assessment details

This standardisation pack has been developed to reflect the requirements of the **Heating engineering – Sample** version. The assessment pack can be access on the City & Guilds website, here.

The evidence used for the exemplar marking in this pack is based on the **Guide Standard Exemplification materials** for this occupational specialism that can be located, here.

3.2. Task Overview

The Practical Assignment is based around a work-based scenario and is made up of three tasks:

Task 1 – Planning the installation

c) Plan the installation of the boiler, the S Plan heating system and the additional radiator in the garage conversion, following the client brief
d) Measure and mark out work area as detailed in your diagram

Task 2 – Installation, commissioning and decommissioning

e) Install the boiler, the S Plan heating system and the additional radiator in accordance with your drawing and as agreed by your assessor.
f) Connect the electrical supply to the boiler from a suitably supplied fused spur connection following the safe isolation procedure
g) Commission the system (pipework only) and handover to customer
h) Decommission the system

Task 3 – Carrying out maintenance

d) Discuss fault with customer, investigate and diagnose fault
e) Produce a written report of the maintenance activity
f) Repair and rectify fault

3.3. 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:

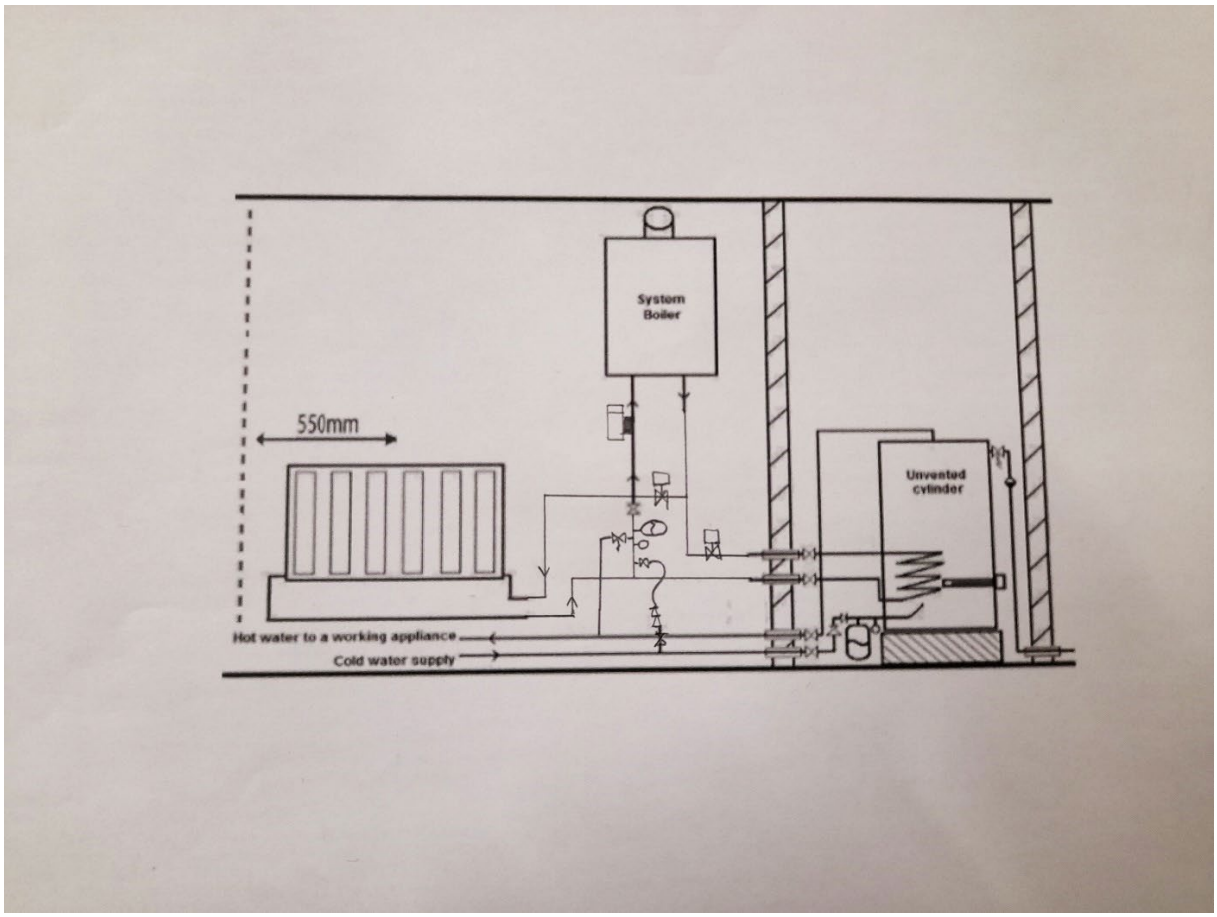
Measuring and marking out of proposed working area

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.**

3.3.1. Task 1 - Candidate evidence

1.1.8. Installation diagram



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

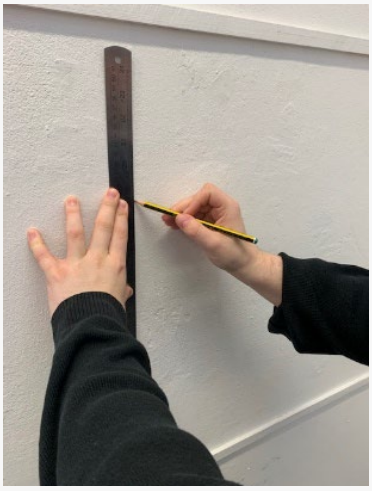
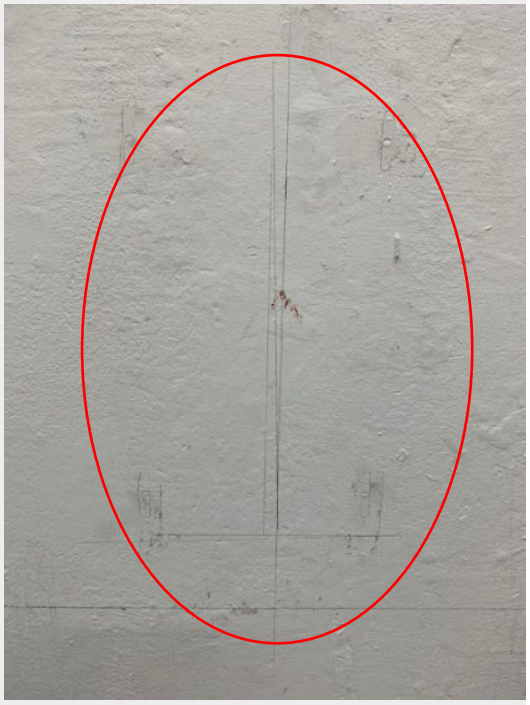
Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate B	CG12345
Centre name	**Assessment theme**
City & Guilds	Systems and components (Installation)

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

Task	**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.*
Measuring and marking out of proposed working area	The candidate used the edge of the wall to establish the correct levels for the installation. The measuring process had some minor inaccuracies which was caused by incorrect use of measuring equipment, the use of the edge of wall instead of a datum line or laser level. Candidate displayed some disorganisation in working from a set point and this resulted in them having to double check some dimensions from the position of the boiler and radiator, which impacted on time. Overall key data was recorded and set out accurately. Candidate took several attempts to mark out resulting in lines left on wall. Candidate has marked out all pipe clips to industry standards and spacing is mostly accurate.

1.1.10. Task 1 - Photographic evidence

Appropriateness of method and equipment used to measure and mark out. Photos may show inaccuracies or multiple attempts at marking out.

Evidence description	Photo
Photograph 1 Candidate marking out a work area using a straight edge that is not the approved method.	
Photograph 2 Work area shows accurate and clear marking out on work surface.	

1.1.11. Risk assessment

This risk assessment may be modified by adding items only.

Activity: Installation of pipework **Location: Centre A**	**Date: xxxxxx** **Position: Candidate**

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?
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	Loose Cables	Tripping	Self Others	Stick all cables down	2	2	4	Yes
4	Hazardous substances	Irritation	Self	Correct use of PPE and ventilation	2	1	2	Yes
5	Manual handling	Personal injury	Self	Correct kinetic lifting techniques	2	1	2	Yes

Activity: Decommissioning **Location: Centre A**	**Date: xxxxxx** **Position: Candidate**
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?**
1	Hazardous waste	Irritation	Self	Correct use of PPE	1	1	1	Yes
2	Manual handling	Personal injury	Self	Correct kinetic lifting techniques	2	1	2	Yes

Activity: Maintenance **Location: Centre A**	**Date: xxxxxx** **Position: Candidate**

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?
1	Pipework	Cut	Self	Take care when handling and removing the valve as pipework exposed could be sharp	1	2	2	Yes
2	Wet surfaces	Slips and trips	Self Others	Watch out for any wet surfaces around the working area	2	1	2	Yes

1.1.12. Method statement

1) Ensure you have the correct PPE

2) Draw the component and pipework layout in pencil on the work surface to the correct measurements

3) Collect all pipework, fittings and necessary tools

4) Measure from the centre line for radiator brackets and fix the brackets in accordance to the specification and minimal consultation of manufacturer's instructions.

5) Fit pipe clips to the correct measurement's and according to the specification

6) Measure and cut the copper pipe, then continue to pull any angles, kicks, or Passovers needed for the task

7) Install the pipework and add the fittings

8) Tighten and double check fittings

9) Clean the pipework and apply flux, then solder pipework and fittings together

10) Pressure test your work.

12) Carry out the installation of the wiring after confirming with assessor it is okay to proceed

13) Fill out paperwork

1.1.13. Material list

Equipment/Materials	Quantity
Pencil	1
Spirit level	1
Tape measure	1
Dust sheets	1
Pipe slice	1
Pipe bending machine	1
Philips screwdriver	1
Adjustable spanners	2
Plug and vent	1
Heat proof mat	1
Blow torch	1
15mm pipe	3
22mm pipe	6
Radiator valves	2
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
Clean cloths	2
S Plan control pack	1
Magnetic filter	1
½” Steel pipe	3
½” Fittings	4
15mm fittings (elbows, tees and valves)	10
22mm fittings (elbows, tees and valves)	10
PPE	
Boiler suit/protective clothing	
Gloves	
Steel toe capped boots	

3.4. 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:
    - Safe isolation process
    - Installation of components
    - Commissioning
    - Handover to customer
    - Decommissioning

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

- Assessor observations:
    - Safe isolation process
    - Installation of components
    - 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 required:

Installation of components

Photographic evidence which shows:

- Tolerances have been met for the measurement of pipework. Photos may show any excess/ waste materials caused by inaccurate measurements – **Photograph 3**
- Finished installation showing finished pipework and component positioning which demonstrates the aesthetics of the completed installation. Visible signs of pipework damage that are not straight or horizontal/vertical and bends that are not properly formed. None of which stops the system operating correctly – **Photographs 4a, 4b, 4c, 4d, 4e, 5 and 6**
- Use of tools (bending and cutting equipment) and piping skills. Photos may show pipework cut offs – **Photograph 7**
- Results of tool usage. Photos may show tooling marks – **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. Photos may show clips that are not equally spaced or installed in line – **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**

3.4.1. Task 2 - Candidate evidence

1.1.9. Practical Observation Form – Safe isolation

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate B	CG12345
Centre name	**Assessment theme**
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.

Task	**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.*
Safe isolation	Candidate took some time starting the task and although was correct in performing the process some initial prompting was required to ensure they were aware of the time. It was clear that there was a lack of awareness from the candidate about managing their time effectively throughout the process. Candidate correctly sourced all the equipment needed and gained permission to proceed from the assessor. The candidate correctly checked the testing equipment and confirmed operation and continued to isolate supply correctly. Tests to prove supply was DEAD had been carried out with accuracy and confirmed the installation was safe.

1.1.10. Practical Observation Form – Installation of components and pipework

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate B	CG12345
Centre name	**Assessment theme**
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.

Task	**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.*
Installation of components	Candidate has ensured all H&S and site preparation works are in place before starting task by putting dust sheets on floor, storing tools and materials in safe location. However, maintenance of workspace during the task was minimal with some tools left out and not stored correctly after use. Candidate prepared the workspace using a suitable 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. Boiler was installed as per manufacturer's instructions and the radiator was installed at a suitable height for correct operation, however, when measured was not completely accurate but within 5mm of tolerance. Candidate made some errors with the pulling of bends, these were correct but resulted in some wasted materials and inaccuracies from original design. Most tolerances met, but minor inaccuracies in the dimensions of the bends and offsets, at a tolerance of 5mm. Overall aesthetics of the installation has not been affected. Candidate has effectively marked out and measured pipework to suitable lengths to carry out the installation, with some wastage of

	materials. The forming of bends was carried out twice due to inaccuracy on first attempt which resulted in material wastage. All S Plan central heating components were installed and wired as per the manufacturer instructions. Magnetic filter has been correctly positioned and installed as per manufacturer instructions Candidate use of tools is mostly good however some tasks require more than one attempt. Candidate uses water pliers incorrectly on brass fittings, resulting in tooling marks to pipework/ components.

1.1.11. Task 2 - Photographic evidence

Tolerances have been met for the measurement of pipework. Photos may show any excess/ waste materials caused by inaccurate measurements.

Evidence description	Photo
Photograph 3 Tolerances (+/-5mm) have been met during the installation of pipework.	

Photograph 4a

Finished installation showing finished pipework and component positioning which demonstrates the aesthetics of the completed installation. Visible signs of pipework damage that are not straight or horizontal/vertical and bends that are not properly formed. None of which stops the system operating correctly.

Finished installation and associated pipework including the installation of both functional and safety controls.

Overall aesthetics of the installation have been met.

Photograph 4b

Photograph 4c

Photograph 5

Pipework not level but within tolerance.

Photograph 6

Pipework level

Pipework level and within tolerance (+/-2mm)

Photograph 7

Use of tools (bending and cutting equipment) and piping skills. Photos may show pipework cut offs.

The correct operation/use of pipe bend machine and pipe cutting tools.

Photograph 8

Results of tool usage

Component fitted correctly with signs of tool marks from installation.

.

Photograph 9

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.

Correct use of blow lamp, safe soldering, correct selection of solder and protection of customer property although heat mat not centrally positioned.

Photograph 10

Use/type of clips. Photos may show clips that are not equally spaced or installed in line.

Incorrect clipped pipe, not plumb.

1.1.12. Practical Observation Form – Commissioning

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate B	CG12345
Centre name	**Assessment theme**
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.

Task	**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.*
Commissioning	Candidate did not follow correct process for commissioning tests. Visual inspection is not completed which results in a small leak from pipework Candidate rectifies leak successfully. Commissioning checks and test are completed. • pressure testing • commission heating and hot-water including confirmation of flow rates checked • operational checks • fill and vent system • ensure all valves are working and leak free • operating temperature

1.1.13. Practical Observation Form – Handover to customer

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate B	CG12345
Centre name	**Assessment theme**
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.

Task	**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.*
Handover to customer	Candidate has arms folded and doesn't make eye contact. Candidate gives information about location of heating system and explains the operating principles of the boiler. Candidate provides detail of maintenance requirements e.g. servicing and maintenance requirements but misses information about the system e.g programmer operation and how to set times. Candidate refers to manufactures instructions at some stages of the task.

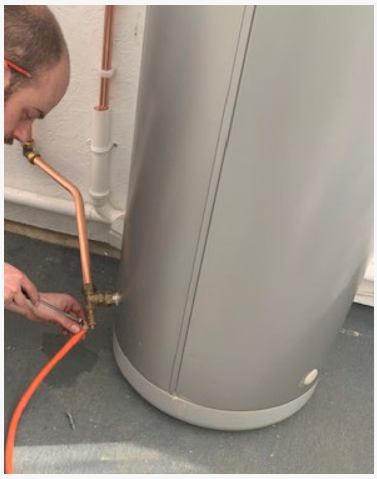
1.1.14. Practical Observation Form – Decommissioning

Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate B	CG12345
Centre name	**Assessment theme**
City & Guilds	Systems and components (Decommissioning)

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

Task	**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.*
Decommissioning	Candidate follows a logical sequence for decommissioning. Candidate follows safe working practices at most stages of the decommissioning. Candidate removed fragile components first to limit risk of damage to components. Candidate correctly identified some of the components that could not be reused and disposed of them in the correct recycling bins. Candidate did miss opportunities to recycle plastic clips. Candidate attempts to make good the working area with the use of appropriate fillers, but the area is not sanded back completely resulting in a poor-quality finish.

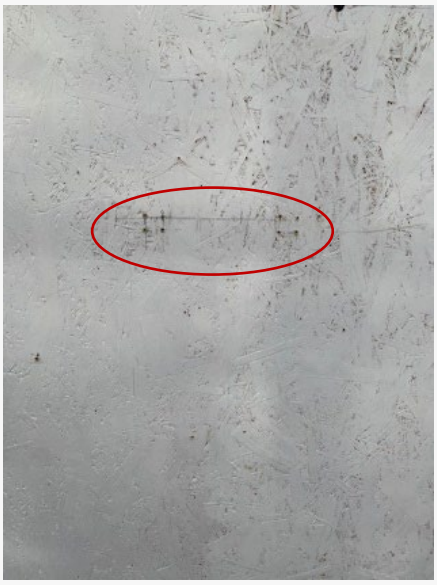
1.1.15. Photographic evidence

Evidence description	Photo
Photograph 11 The system being drained down safely and economically to the correct location. Preparation for draining down: correct equipment and drain point used to drain down system pipework for decommissioning activities.	
Photograph 12 Decommissioning of pipework and components for the system installation Pipework decommissioned correctly with minimal consideration of recycling. No separation of different materials. No separation of clean/dirty copper.	

Photograph 13

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

Some holes and marks still evident from complete decommissioning of pipework.



3.5. 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
    - 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

Fault diagnosis and rectification of fault.

Photographic evidence which shows:

- Results of tool usage. Photos may show tooling marks – **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**

3.5.1. Task 3 - Candidate evidence

1.1.2. Writing a report of maintenance activity

Maintenance activity

FAULT No Central Heating

Description of fault diagnosis

I had a discussion with the customer who informed me that the heating wasn't working, on closer inspection I could see that the pump did not work and needed to be replaced.

Possible solutions

The solution to this problem is to replace the pump.

Actions taken to rectify fault

To repair the fault I carried out the following sequence

- Inform customer
- Isolate the electricals and water
- Apply temporary continuity bonds
- Disconnect the pump from the electrics
- Remove the pump and replace it with a new one.
- Turn on the water supply and check for leaks.
- Reconnect the electrics
- Remove continuity bonds
- Turn on heating system.
- Inform customer I had finished

1.1.14. Practical Observation Form – Fault diagnosis and fault rectification

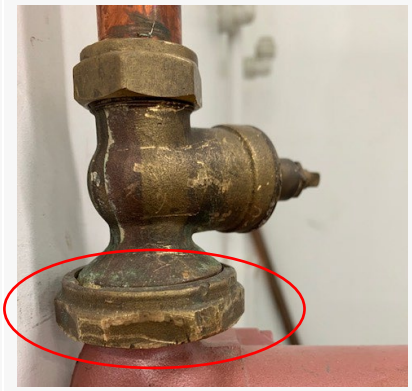
Assessment ID	Qualification number
8710-355	8710-36
Candidate name	**Candidate number**
Candidate B	CG12345
Centre name	**Assessment theme**
City & Guilds	Working with faults/ Handover & communication

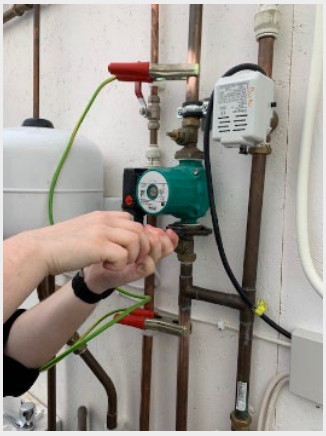
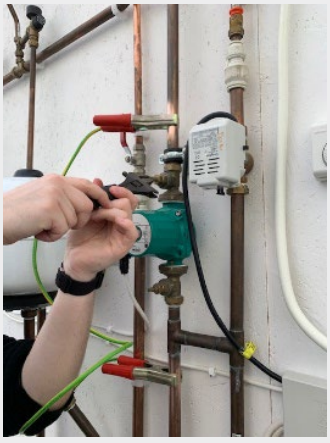
Complete the table below referring to the relevant marking grid, found in the assessment pack. **Do not** allocate marks at this stage.

Task	**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.*
Fault diagnosis and customer discussions	Candidate shows some nerves at the beginning of the customer discussion, with an initial lack of eye contact and inappropriate body language. Candidate has their arms folded and misses some opportunities to put the customer at ease. The candidate asked various questions to gain an insight into the fault and some of these where irrelevant to the task. Appropriate questions were eventually asked: • Is the fault at a single radiator? • How frequent is the fault? • Do you have hot water? This allowed candidate to make some judgments and trace the fault to the appropriate component although this may have been guesswork/trial and error rather that systematic fault analysis. Candidate carries out a visual inspection of the system to identify the source of the fault.

Fault rectification	Candidate considers health and safety preparations, using dust sheets, removing customer property where required and ensuring warning notices were in place as appropriate 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. Candidate selected correct tools to remove the defective component without excessive tool damage to the compression joints. The use of adjustable spanners over water pump pliers ensured there was no marking to the brass compression fittings. Candidate did not confirm pump was isolated from the water supply prior to disconnection and did not have a bowl underneath to catch any water.

1.1.16. Task 3 - Photographic evidence

Evidence description	Photo
Photograph 14 Results of tool usage. Component fitted correctly with signs of tool marks from installation of replacement component.	
Photograph 15 and 16 Sequence of photos which show the replacing and removal of the faulty component, and reinstallation of the new component. Loosening of faulty component.	15.  16. 

Photograph 17 Removal of faulty component.	
Photograph 18 to 19 Replacement of component.	18.  19. 

Photograph 20

System on completion of all works.

Repair completed with signs of leaks which have been repaired.

3.6. Guidance on the exemplar marking

Within this standardisation pack, a partially completed CRF form has been provided that outlines how an assessor has awarded marks against the candidate evidence for a number of the assessment themes.

For the purposes of these materials the Marking Grids used can be found in the Sample Assessment Materials here.

For exemplification purposes, an explanation of how the marker has determined the mark to be awarded is provided, this exemplary document showing

- How the marker has first considered the marking bands available and determined within which band the evidence best fits
- Subsequently, consideration within the determined band and justification for the mark to be awarded within that band.

3.7. Candidate Record Form (CRF) – Heating engineering (8710-35/36) (355)

Candidate name	**Candidate number**
Candidate B	CG12345
Centre name	**Centre number**
City & Guilds	123456

Marker Notes – Please always refer to the relevant marking grid for guidance on allocating marks and make notes which describe the quality of the evidence and justification of marks. Expand boxes as required

Health and safety												
	Band 1				**Band 2**				**Band 3**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Band **2**	**Band justification** *The candidate has demonstrated that they have exceeded the requirements of the lowest marking band:* *Risk assessment is complete and covers a good range of risk factors, Risk mitigation methods have* *been identified for some of the potential risks, but not all.* *Consideration is given to potential for harm and probability factors.* *Health and safety is followed during preparation and throughout tasks and all work completed safely.* *Therefore, the mark to be awarded sits within the middle marking band.*											
Mark **7**	**Mark justification** *The candidate demonstrates a good knowledge and understanding of the different types of risk and hazards associated with heating activities. The candidate has identified the major hazards and associated risks for each of the tasks. The candidate demonstrates some understanding of the mitigations that can be used to minimise the identified risks and hazards and has attempted to identify controls, although these are somewhat brief the candidate does demonstrate some understanding by making links to the correct use of PPE, and use of wet rag to cool hot pipework. The probability of each of the hazards/ risks occurring has been attempted and mostly accurate and realistic.*											

	Due to the reasons outlined here –the response has been determined to be at the upper end of the middle marking band and a mark of 7 has been awarded.

Design and planning – Documents									
	Band 1			**Band 2**			**Band 3**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

Band **1**	**Band justification** *The candidate has demonstrated that they meet the requirements of the lowest marking band:* *Documents are brief but correct in process but with minor inaccuracies in technical knowledge and sequencing. No reasoning provided to justify choices made.* *Key materials, quantities and PPE required to meet the brief have been identified with some consideration given to the aesthetics of the finished installation.* *Therefore, the mark to be awarded sits within the lower marking band.*
Mark **3**	**Mark justification** *The candidate demonstrates a good understanding of the sequencing of activities in relation to the given tasks, marking out tasks, collecting materials and installing components before clipping out. The methods given follow the logical stages of the installation, cutting and bending before soldering and pressure testing. The methods statements identify all the key steps, the steps are brief but accurate, however no reasoning or justification has been given to support the methods given* *The candidate shows good knowledge and understanding of the different resources required to carry out the tasks and meet the requirements of the assignment brief. The candidate has selected the minimum materials and equipment required to allow for a successful installation in line with the assignment brief. The candidate has identified quantities that are accurate and relevant to the tasks. 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.* *Due to the reasons outlined here –the response has been determined to be in the middle marking band and a mark of 3 has been awarded.*

Working with faults												
	Band 1				Band 2				Band 3			
	1	2	3	4	5	6	7	8	9	10	11	12
Band	**Band justification**											
1	*The candidate has demonstrated that they meet the requirements of the lowest marking band:* *Fault-finding techniques were carried out with some success demonstrating knowledge of fault-finding techniques that was appropriate.* *Investigation and analysis of fault was clear and followed some logic* *Reference was made to manufacturer's instructions at some points during the fault diagnosis.* *Rectification of fault follows a logical process and is completed efficiently with only minor mistakes.* *Use of tools is basic, and requires more than one attempt, resulting in pipework installations that may be over soldered or with excessive tooling marks.* *Therefore, the mark to be awarded sits within the lower marking band.*											
Mark	**Mark justification**											
4	*The candidate lacked some confidence when carrying out the discussion with the customer, not always making eye contact and standing with arms folded. The candidate asked questions to the customer to try and determine the cause of the fault, however some of the questions asked were irrelevant to the task and fault-finding process. The candidate did eventually ask enough appropriate questions to diagnose the fault, demonstrating a good knowledge of the operating principles/ service requirements of the heating system/ appliance. The candidate demonstrates a good understanding of the methods and techniques used to diagnose faults on heating systems/ components. The diagnosis of the fault followed a logical sequence. The candidate shows some 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 however, some reassurance was needed from the assessor with some aspects and made some minor mistakes that did not impact the finished product. The candidate is able to select the correct tools for the task. The use of tools is mostly good however, some tasks require more than one attempt resulting in tooling marks to components/ pipework.* *Due to the reasons outlined here –the response has been determined to be in the bottom marking band and a mark of 4 has been awarded.*											

Internal assessor name	Date
Internal assessor signature	

Total mark
*/90

* Please Note that the Total Mark (90) applies to the full assignment including all Assessment Themes

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About City & Guilds

Since 1878 we have worked with people, organisations and economies to help them identify and develop the skills they need to thrive. We understand the life changing link between skills development, social mobility, prosperity and success. Everything we do is focused on developing and delivering high-quality training, qualifications, assessments and credentials that lead to jobs and meet the changing needs of industry.

We work with governments, organisations and industry stakeholders to help shape future skills needs across industries. We are known for setting industry-wide standards for technical, behavioural and commercial skills to improve performance and productivity. We train teams, assure learning, assess cohorts and certify with digital credentials. Our solutions help to build skilled and compliant workforces.