T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Building Services Engineering for Construction

Heating Engineering

Guide standard exemplification material

Threshold competence – Sample 2021

City & Guilds | eal

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

Contents

Introduction

The sample assessment materials within this document refers to the heating engineering sample occupational specialism assignment. The aim of these materials is to provide centres with examples of knowledge, skills and understanding that attest to minimal threshold competence. In this document all exemplar evidence attests as examples of minimal threshold competence. The examples provided do not reflect all evidence from the sample assignment as the focus of this material is the quality and standards that need to be achieved rather than the volume of exemplar evidence provided. However, the examples provide a representative of all tasks in the sample assignment. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and standard of performance will vary across task and minimal threshold competence will be based on a synoptic mark across all tasks.

The materials in this GSEM are separated into three sections as described below. Materials are presented against a number of tasks from the assignment.

Task

This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photographic evidence. Also referenced in this section are the assessment themes the candidates will be marked against when completing the tasks within it. In addition, candidate evidence that has been included or not been included in this GSEM has been identified within this section.

In this GSEM there is candidate evidence from:

Task 1

Task 2

Task 3

Candidate evidence

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

Commentary

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

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

Grade descriptors

To achieve a 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.

Use industry terminology most of the time that is accurate in both written and verbal contexts.

Task 1 – Planning the installation

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

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

- Risk assessment
- Method statement with justifications
- Installation 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

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:

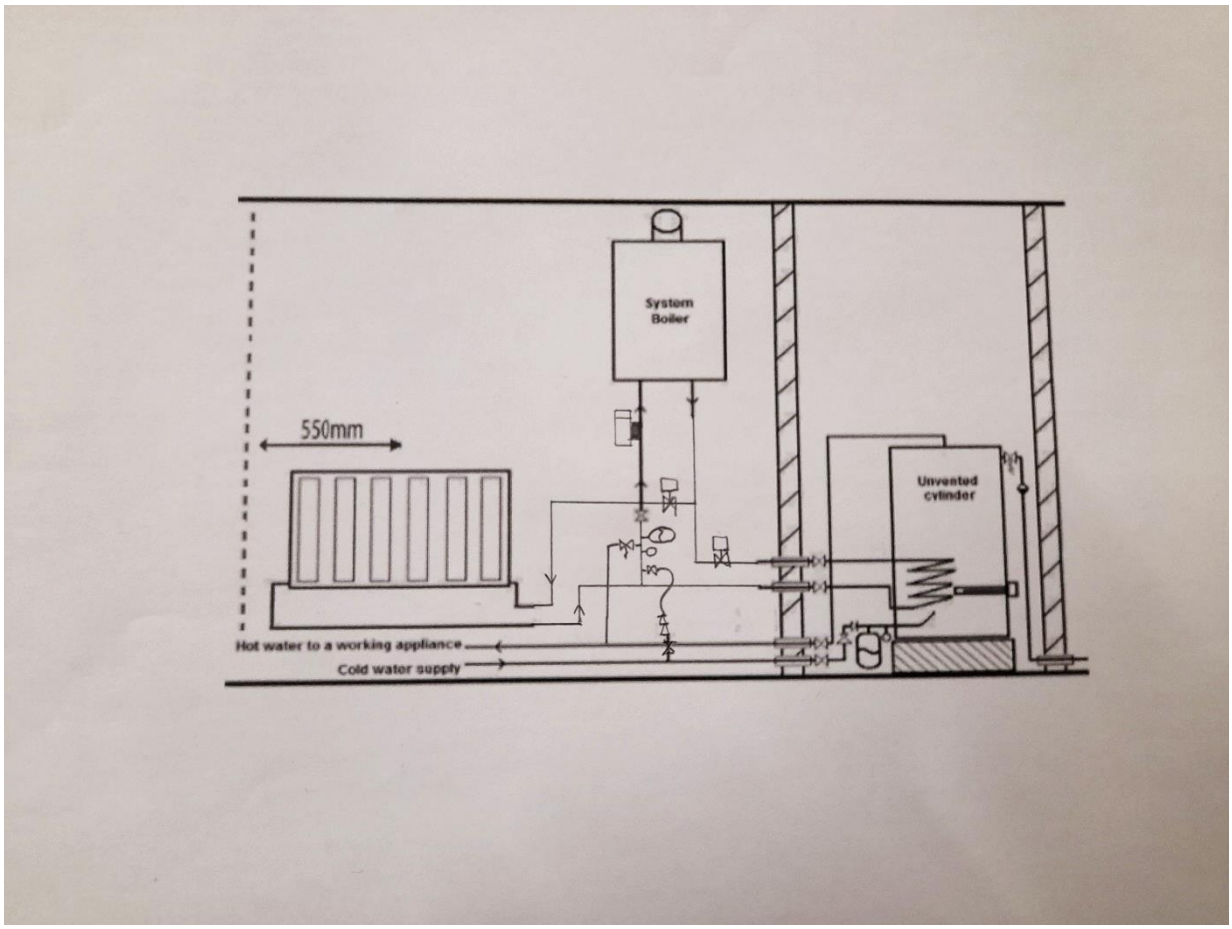
Measuring and marking out of proposed working area.

Photographic evidence which shows:

- Appropriateness of method and equipment used to measure and mark out. Photos may show inaccuracies or multiple attempts at marking out – **Photograph 1 and 2.**

Candidate evidence

Installation diagram



Commentary

The candidate has completed the installation diagram considering all aspects required to meet the assignment brief.
The candidate demonstrates good knowledge and understanding of heating components and functional controls and has correctly identified all the associated components and functional controls and positioned them in the correct order on the diagram.
The completed drawing does have minor inaccuracies. Some dimensions are missing, the distance of the pipe clips is not provided.
The candidate shows a good understanding of the requirements of installation diagrams and the overall drawing is clear.

Candidate evidence

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 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.

Assessor signature	Date
Assessor A	31/01/2021

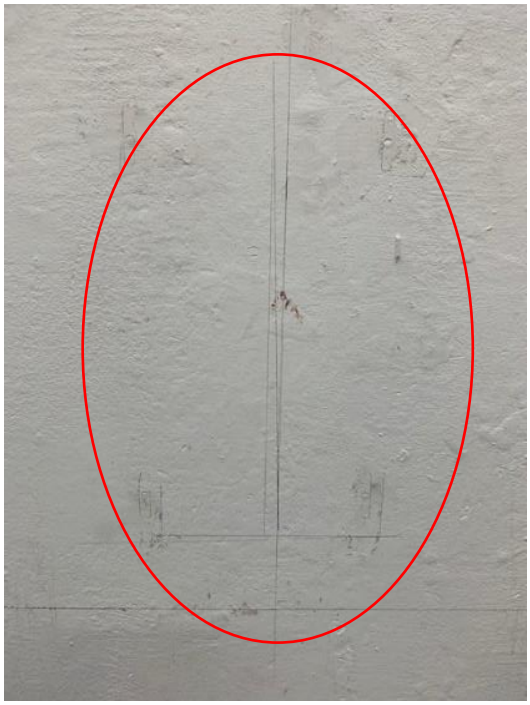
Photographic evidence

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

Photograph 1

Candidate marking out a work area using a straight edge that is not the approved method.

Photograph 2



Work area shows multiple marks on work surface from marking out due to initial inaccurate measuring and marking out.

Commentary

The candidate demonstrates that they can take measurements from an allocated space/ work area in line with their installation diagram.
The candidate used measuring and marking out equipment which was not best practice for this task. This resulted in some minor inaccuracies, which could impact on the installation pipework not being plumb and level and the finished aesthetics of the installation.
The marking out took several attempts resulting in lines left on wall.
The measurements were recorded accurately and clearly.
The pipe clips have been marked out to industry standards and spacing is mostly accurate.

Candidate evidence

Risk assessment

Activity: Installation of pipework **Location: Centre A**	**Date: 31/01/21** **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: 31/01/21 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: 31/01/21 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

Commentary

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.

Candidate evidence

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

Commentary

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.

Candidate evidence

Materials 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	
Goggles	

Commentary

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.

Task 2 – Installation, Commission and Decommission

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

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

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

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

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

The following task 2 candidate assessment requirements have not been included as example candidate evidence for this version of the guided 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**

Candidate evidence

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 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.

Assessor signature	Date
Assessor A	31/01/2021

Commentary

Candidate carried out all necessary steps in the safe isolation process. The safe isolation process was correct in method.

Candidate evidence

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	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.*
Installation of components and pipework	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.

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.*
	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.

Assessor signature	Date
Assessor A	31/01/2021

Photographic evidence

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

Photograph 3

Tolerances (+/-5mm) have been met during the installation of pipework.

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.

Photograph 4a

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

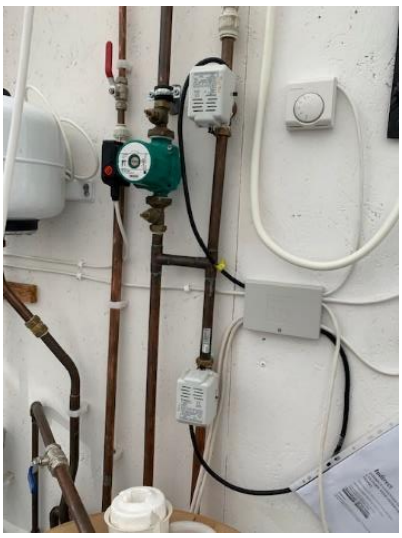
Overall aesthetics of the installation have been met.

Photograph 4b

Photograph 4c

Photograph 4d

Photograph 4e



Photograph 5

Pipework not level but within tolerance.

Photograph 6

Components correctly installed but not level.

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

Photograph 7

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

Results of tool usage.

Photograph 8

Component fitted correctly with signs of tool marks from installation.

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

Photograph 9

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

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

Photograph 10

Incorrect clipped pipe, not plumb.

Commentary

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

The candidate prepares the workstation with dust sheets and stores tools safely at some stages of the tasks, showing a good consideration and understanding of health and safety.

The candidate is mostly confident in the practical elements of the task, however they require some reassurance from the assessor, for example with the selection and use of appropriate tools and components. The candidate can successfully select correct tools and components but at times looks for confirmation form the assessor before proceeding with the task. The use of tools is mostly good however some tasks require more than one attempt/ or the wrong tool is used, for example water pliers incorrectly used on brass fittings, resulting in tooling marks to pipework/ components.

The candidate meets some tolerances for the task.

The candidate completes the installation in the allocated time, however it is clear that timing was not planned thoroughly, and the later parts of the installation are rushed.

Candidate evidence

Practical Observation Form – Commissioning

Assessment ID	Qualification number
8710-355	8711-36
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
City & Guilds	Inspecting and testing of systems 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

Assessor signature	**Date**
Assessor A	31/01/2021

Commentary

The candidate demonstrates a good understanding of commissioning and completes the required commissioning tests and checks for both installations, however the tests and checks do not always follow a logical sequence.

Test and checks are completed accurately but with some impact on timings, due to missing the visual inspection.

Candidate makes reference to manufacturer's guidance at some stages during the task.

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

Candidate evidence

Practical Observation Form – Handover to the 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 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.

Assessor signature	Date
Assessor A	31/01/2021

Commentary

The candidate demonstrates a good understanding of the handover process and the operating principles of the systems and these were explained to the customer as part of the handover. The handover of the system to the customer was mostly clear and accurate, however some minor details were missed, eg maintenance requirements.

The candidate displays some customer care skills, but these were limited with minimal eye contact and interaction with the customer.

Candidate evidence

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 (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.

Assessor signature	**Date**
Assessor A	31/01/2021

Photographic evidence

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

Photograph 11

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

Decommissioning of pipework and components for the system installation

Photograph 12

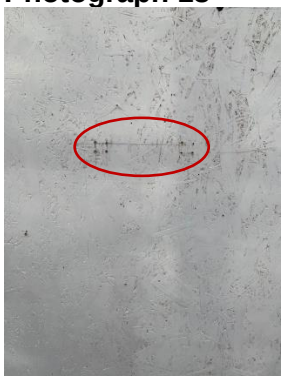
Pipework decommissioned correctly with minimal consideration of recycling.

No separation of different materials.

No separation of clean/dirty copper.

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

Photograph 13



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

Commentary

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

The candidate correctly identified some of the components that can be reused, showing a good knowledge and understanding of the reuse and recycling of different materials.

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

The candidate shows some understanding of the methods and materials/ resources required to make the working area clean and presentable. The candidate completed some of the process, by filling holes, however, does not have time/ or is lacking in attention to detail when sanding back or re-painting, resulting in a poor-quality finish, demonstrating minimal consideration to customer property.

Housekeeping was mostly good and candidate made attempts to clean water spillages and debris from sanding.

Task 3 – Carry out maintenance

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

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

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

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

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

Photographic evidence required:

Fault diagnosis and rectification of fault

Photographic evidence which shows:

- Results of tool usage. 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**

Candidate evidence

Written report of maintenance activity

Appendix 1 Maintenance activity report

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

Appendix 2
Appendix 3

Commentary

The maintenance report completed is brief and, in a bullet, pointed format.
The candidate demonstrates good understanding of the maintenance requirements, for the given task, and provides a brief but accurate description of the fault diagnosis process.
Only one solution was given, could have given an alternative for example pipe freeze repair.

The candidate identifies a brief but accurate 10 step process/ sequence to rectify the fault, which shows a good knowledge and understanding of how to repair and rectify the fault.
No reasoning has been given to support the methods selected to rectify the fault.

Candidate evidence

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 themes**
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 discussion	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.

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.*
	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.

Assessor signature	Date
Assessor A	31/01/2021

Photographic evidence

Results of tool usage.

Photograph 14

Component fitted correctly with signs of tool marks from installation of replacement component.

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

Photograph 15

Photograph 16

Loosening of faulty component.

Photograph 17

Removal of faulty component.

Photograph 18

Photograph 19

Replacement of component.

System on completion of all works.

Photograph 20

Repair completed with signs of leaks which have been repaired.

Commentary

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.

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