

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

**Protection Systems
Engineering**

**Guide standard exemplification material
Distinction – Sample 2021**

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Introduction

The sample assessment materials within this document refers to the Protection Systems 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 distinction grade. In this document, all exemplar evidence attests as examples of distinction grade. 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 provided are 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 tasks. 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 photographic/video 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 a description of the task and how the task links to the relevant assessment themes. It may also include the candidate's work, photographs of the work in production (or completed) and practical observation records of the assessment completed by centre assessors. This will be actual evidence that was captured as part of the assessment and then internally marked by the centre assessor.

Commentary section - This section includes detailed comments to demonstrate how the candidate evidence attests to the standard of distinction by directly correlating to the grade descriptors for this occupational area. Centres can compare the evidence against the performance indicators in the marking grid descriptors within the assessor packs, to provide guidance on the knowledge, skills and understanding that needs to be achieved for distinction 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 distinction, a candidate will be able to:

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

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

Work safely and make informed and appropriate use of tools, materials and equipment within the environments that they are working in. They will competently and independently interpret information and apply the technical skills to practical tasks and procedures to an exemplary standard as recognised by industry, producing an excellent quality of work that meets acceptable tolerances, regulations and standards.

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

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

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

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Task 1 – Planning the installation

(Assessment themes: Health and safety, design and planning)

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

Plan the installation of the I&HAS to include:

- Risk assessment
- Method statement with justifications
- Building plan with device locations indicated, with justifications
- Dimensional drawing of proposed installation in the given work area
- Materials list.

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

- Risk assessment
- Method statement with justifications
- Dimensional drawing of proposed installation in the given work area
- Materials list
- Assessor observation of measurements and marking out of space allocation/work area, should include how well the learner accurately measured the work area, checked against their dimensioned drawing.

The following Task 1 candidate assessment requirements have not been included as example candidate evidence for this version of the guided exemplification materials:

- Building plan with device locations indicated, with justifications
- Assessor observation showing details of any intervention and feedback where a candidate has produced a plan that is not fit for purpose.

Candidate evidence

Task 1 - Risk Assessment

Activity: Installation of containment		Date: 12 2 2021						
Location: Workspace		Position: Candidate						
SEVERITY (S): Degree of harm which may be caused (including numbers affected)						RISK RATING (RR): Severity x Likelihood		
1 Minor Injury 2 Major Injury 3 Fatality						1-2 Low		
LIKELIHOOD (L): Probability that event will occur						3-5 Medium		
1 Remote 2 Possible 3 Likely						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	Installation of containment Cutting	Cuts/Scratches	Staff	Wear suitable gloves. Remove burrs immediately.	1	1	1	Y
2	Installation of containment 230 V AC containment	Death/Shock	Staff	Carry out safe isolation, lock-off and tag procedure under supervised conditions.	3	2	3	Y
3	Installation of containment Loose Cables	Tripping	Staff	Maintain a tidy work area. Cut cables to length, or coil excess and secure out of the way.	1 /2	1	1	Y
4	Installation of containment Fixing	Cuts/Bruises/Fragments in eyes	Staff	Wear suitable gloves. Wear eye protection.	1 /2	1	1	Y
Activity: Installation of components		Date: 12 2 2021						
Location: Workspace		Position: Candidate						
SEVERITY (S): Degree of harm which may be caused (including numbers affected)						RISK RATING (RR): Severity x Likelihood		
1 Minor Injury 2 Major Injury 3 Fatality						1-2 Low		
LIKELIHOOD (L): Probability that event will occur						3-5 Medium		
1 Remote 2 Possible 3 Likely						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	Installation of components Cable preparation and connection	Cuts/Scratches	Staff	Use appropriate tools.	1	1	1	Y
2	Installation of components 230 V AC containment	Death/Shock	Staff	Carry out safe isolation, lock-off and tag procedure under supervised conditions.	3	2	3	Y
3	Installation of components Component installation	Cuts/Scratches	Staff	Wear suitable gloves. Use appropriate tools.	1	1	1	Y

Activity: Decommissioning

Location: Workspace

Date: 12 2 2021

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	Decommissioning Contamination	Radioactive detectors. Fibre optic particles.	Staff	Do not dismantle devices. Dispose of devices as per company policy. Wear suitable PPE.	1	1	1	Y
2	Decommissioning 230 V AC electrical supply disconnection	Death/Shock	Staff	Carry out safe isolation, lock-off and tag procedure under supervised conditions. Leave in a safe condition in case circuit is re-energised in the future.	3	1	2	Y
3	Decommissioning Component removal	Cuts/Scratches	Staff	Wear suitable gloves. Use appropriate tools.	1	1	1	Y

Activity: Maintenance

Location: Workspace

Date: 12 2 2021

Position: Candidate

SEVERITY (S): Degree of harm which may be caused (including numbers affected) 1 Minor Injury 2 Major Injury 3 Fatality					RISK RATING (RR): Severity x Likelihood				
LIKELIHOOD (L): Probability that event will occur 1 Remote 2 Possible 3 Likely					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	Maintenance Contamination	Radioactive detectors. Fibre optic particles.	Staff	Do not dismantle devices. Dispose of devices as per company policy. Wear suitable PPE.	1	1	1	Y	
2	Maintenance 230 V AC electrical supply	Death/Shock	Staff	Carry out safe isolation, lock-off and tag procedure under supervised conditions. Leave in a safe condition in case circuit is re-energised in the future.	3	1	2	Y	
3	Maintenance Component replacement	Cuts/Scratches	Staff	Wear suitable gloves. Use appropriate tools.	1	1	1	Y	

Commentary

The candidate demonstrates a thorough knowledge and understanding of the different types of risk and hazards associated with the tasks, identifying all key hazards and associated risks. The candidate identifies relevant controls for all of the identified risks and makes clear justification and reasoning for the control measures that are appropriate. Potential for harm and probability factors have been identified throughout.

Candidate evidence

Task 1 - Method statement

Method statement of the installation

Ensure I have the correct PPE which includes steel toe cap boots, boiler suit, eye protection, gloves, 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 work space 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.

Measure and mark out the component positions in pencil, checking that the distances are as per the dimensioned drawing. I will mark out, using a spirit level, the runs for all surface clipped cables.

I will collect all materials, tools, cables and components as per my materials list. I will put them in a safe place in the working area where they are easily accessible but do not cause a trip hazard.

Install the components in their respective locations, checking all measurements and using a spirit level, where appropriate, to ensure all components are straight and level. Where applicable, set programming jumper links / switches in detectors and other devices.

Install the cable containment, using a spirit level to check level / plumb.

Install all low voltage cables as per the design drawing and system specification, connecting each one at the detector / device as it is installed, and labelling them in the CIE. Connect all cables in the CIE.

Ensure that the 230 V AC supply is isolated and locked off. Test the supply terminals in the unswitched fused spur outlet to prove 'dead', using the correct test procedure detailed in GS-38, and as detailed in my own safe isolation report. Install and connect the 230 Vac supply cable and re-fit all covers / barriers. Obtain proof in the form of an Installation Certificate that the 230 Vac fused spur installation has been tested to BS 7671 by a competent person. Re-instate the 230 V AC supply with the 5 A fuse removed from the unswitched fused spur outlet.

Perform a visual inspection of all connections, ensuring that they are all correct, with no exposed conductors at the terminals.

Insert the 5 A fuse into the unswitched fused spur outlet to energise the I&HAS. Wait for CIE to boot-up and PIR's to adapt to their IR environment. Program the CIE Zones as per the system specification. Set the shock sensor sensitivity. Replace all covers. Put the CIE into Walk Test mode and fully test all detectors in terms of range, coverage, and sensitivity. Test all signalling equipment.

Place the CIE into engineer programming mode and remove the front cover. Check that the multimeter that I am to use has a current calibration certificate and complete the Record of Operational Checks. Replace the CIE front panel and restore it to Unset / Day mode.

Clean up the work area, ensuring that the floor area is clear of all debris, tools and leftover materials. Ensure that all equipment, detectors, etc. are all clean with no finger marks or dirt on the covers.

Prepare all documentation required for a full system handover, including a handover acceptance certificate, system instruction manual, Zone list, and company contact details. Handover the system to the customer, providing them with a full walk test and demonstration

of system operation. Have the customer demonstrate that they are confident they can set, unset, and part set the system, and re-set the system in the event of an alarm activation.

Complete the handover document, and pass the system instruction manual, Zone list, and company contact details to the customer.

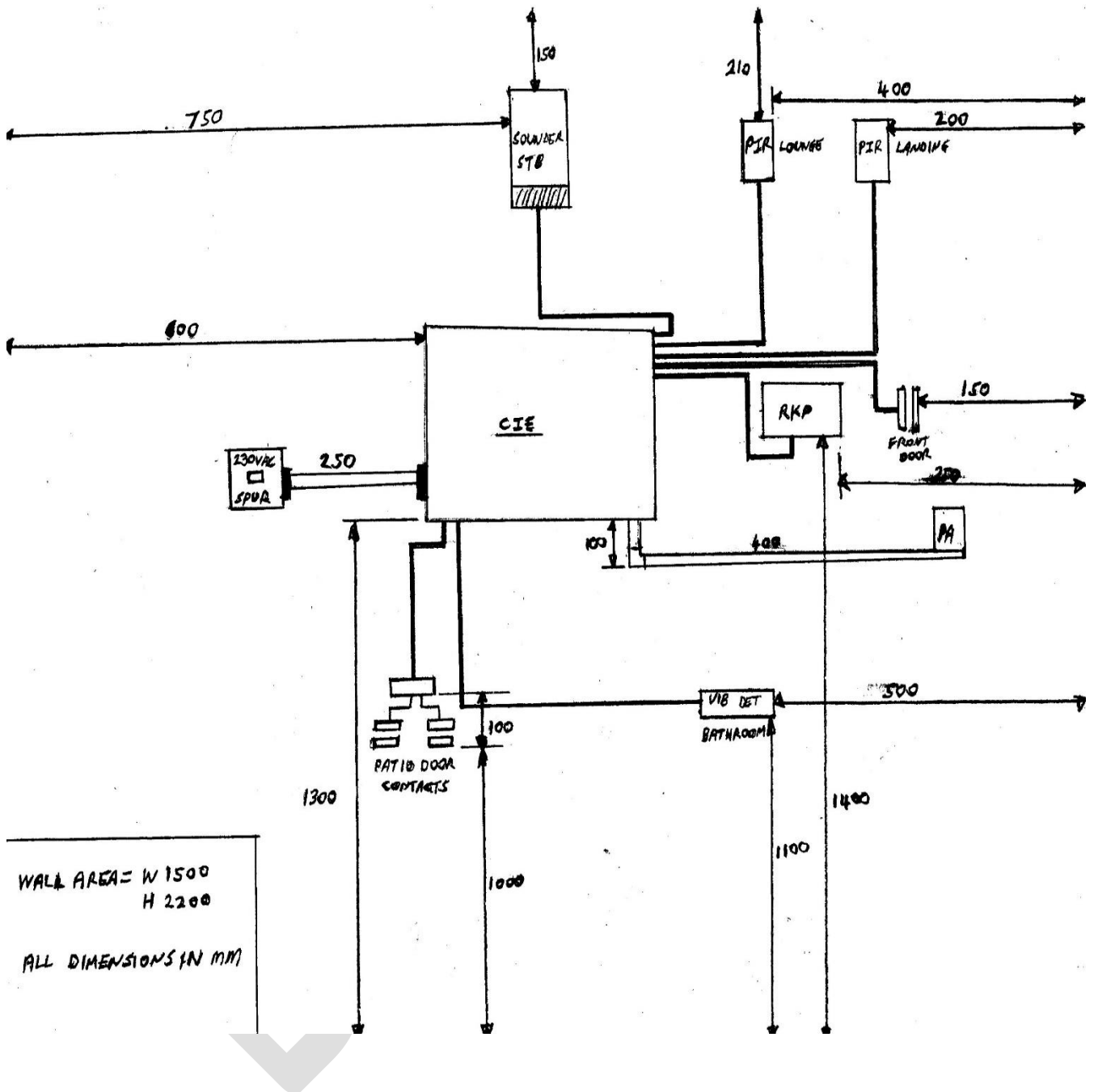
Commentary

The candidate demonstrates a comprehensive understanding of the sequencing of activities in relation to the tasks, detailing all aspects of the installation. For example, marking out tasks, collecting materials, installation sequence, power connection sequence, system programming, and final handover. Also, extensive use of spirit level for checking both horizontal and vertical lines.

The method statement is detailed and accurate, and reasoning has been provided to support the methods and process demonstrating a good underpinning knowledge of each task in the installation and commissioning process.

Candidate Evidence

Task 1 - Dimensional drawing



Commentary

The candidate demonstrates excellent knowledge and understanding having completed the dimensional drawing with consideration to all aspects required to meet the assignment brief. It is annotated clearly and identifies all system components, component location with respect to the work area edges and containment dimensions and produced a detailed drawing to a suitable scale is well presented and accurate with all dimensions included.

The candidate worked alone and did not require any intervention at any time and the task was completed within the required time period, to an excellent standard.

Candidate evidence

Task 1 - Materials list

Equipment/Materials	Quantity
Pencil	1
Spirit level	1
Tape measure	1
Screwdriver set (Philips, flat, terminal)	1
Wire cutters	1
Wire stripper	1
Pliers (long nose and Bull nose)	1
Hammer	1
Hacksaw	1
De-burring tool	1
Flat file	1
Power drill + range of bits	1
Multimeter + leads	1
Voltage detector + Proving unit	1
Lock-off and tag kit	1
Screws (various sizes)	50
Clean cloths / pack of wipes	1
Dustpan / brush / Vacuum	1
CIE + RKP	1
CIE 2.1Ah backup battery	1
External sounder	1
Door contact	2
8-way junction box	1
PIR	2
PA button	1
Vibration detector	1
8 core alarm cable	25 m
4.5 mm cable clips	25
0.75 mm ² 3 core flexible cable	0.55 m
20 mm PVC conduit	0.5 m
20 mm conduit female adaptor	2
20 mm conduit saddle	3
PVC mini trunking	0.5 m
PVC mini trunking flat bend	1
PPE	
Boiler suit/protective clothing	
Steel toe capped boots	
Goggles	
Gloves	
High Visibility Vest	

Commentary

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

The quantities listed are accurate and relevant to the task with detailed specifications where relevant such as battery ratings.

Candidate identifies all tools, equipment, resources, components and PPE with accurate quantities to carry out the tasks and meet the assignment brief. The detail in this list indicates that the candidate has studied the system specification and task requirements in detail, paying careful attention to every part of the task. The candidate has considered aspects of health and safety and listed the PPE required to carry out the tasks safely.

Full consideration has been given to aesthetics of the finished product by including the use of cleaning tools/materials to enable final cleaning of the system components and the work area.

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Candidate evidence

Task 1– Measuring and marking out of proposed working area

Practical observation

Assessment ID	Qualification number
8710 -357	8710 – 31
Candidate name	Candidate number
Candidate A	CG12345
Centre name	Assessment theme
City & Guilds	Design and planning

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 work area	<p>The candidate has followed the correct and logical process for marking out without error or omission.</p> <p>Use of measuring equipment was deft and professional.</p> <p>The candidate considered all aspects of the design layout with full consideration made of workspace/area.</p> <p>Dimensions were measured accurately and error free as detailed in the dimensional drawing.</p>

Assessor signature	Date
Assessor A	31/01/2021

Commentary

The candidate demonstrates that they can take use measuring equipment and take accurate measurements all within tolerance within an allocated space/work area and use the information gathered to be able to produce a system design and dimensioned drawing.

Task 2 – Installation, Commission and Decommission

(Assessment themes: Health and safety, systems and components, inspection and testing, commissioning and handover, reporting and information)

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

- Installation
- Connection of electrical supply
- Commissioning of system
- Decommissioning
- Completed Record of Operational Checks (Appendix 2)
- Written report of safe isolation
- All required documentation available and completed, as required, during system handover to customer.

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

- Written report of safe isolation
- Assessor observations:
 - Safe isolation
 - Installation of the system - to include the selection and use of tools, working to tolerances and clipping and cabling
 - Commissioning - selection and use of test instruments and 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 exemplification materials:

- Completed Record of Operational Checks (Appendix 2)
- All required documentation available and completed, as required, during system handover.

Photographic evidence required:

Installation

Photographic evidence which shows:

- Candidate clearly marking out the location of key aspects of the installation **(photograph 1)**
- The installation of adequate cable clips and supporting brackets, using hand and power tools **(photograph 2)**
- The candidate cutting and installing PVC trunking and conduit using hand tools **(photograph 3)**
- The installation of all I&HAS cables and components, in line with current regulations and manufacturer's literature **(photographs 4, 5 and 6)**

Commissioning and Handover

Photographic evidence which shows:

- The candidate programming the system (**photograph 7**)
- The candidate using a multimeter and voltage indicator to perform safety and functional tests on the system (**photograph 8**)

Decommissioning

Photographic evidence which shows:

- The safe removal of system components, cables, and containment (**photograph 9**)
- Making good of building fabric such as filling of screw holes, painting over marking, etc. (**photograph 10**)
- The safe storage of components and waste segregation (**photograph 11**)

Candidate evidence

Task 2 - Written report of safe isolation

Safe isolation of 230 V AC supply

- Obtain permission to start work
- Identify the source of supply to the fused spur outlet
- Isolate the supply
- Lock off the supply and fit suitable warning sign that the circuit is being worked on
- Prove that the approved voltage indicator is functioning correctly
- Test between all incoming supply terminals in the fused spur outlet to prove that they are 'dead'
- Prove that the approved voltage indicator is functioning correctly
- Once the circuit has been proven to be 'dead', work can begin

Candidate evidence

Task 2 – Safe isolation

Practical Observation Form

Assessment ID	Qualification number
8710-357	8710 – 31
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	<p>The candidate followed a clear and logical sequence, reviewed the method statement once and then continued until the task was completed without the need to reference again. The candidate selected all the equipment required correctly, including voltage indicator, proving unit, lock off kit, correct signage. The candidate used the instruments adeptly and checked the testing equipment correctly and confirmed operation before continuing with tests to prove the supply was dead. The candidate could clearly articulate the purpose of each step in ensuring the electrical supply was correctly isolated. Candidate correctly identified signage and placed notices to advise the system was isolated and tested.</p> <p>The candidate always retained the lock off key on their person whilst working on the circuit.</p>

Assessor signature	Date
Assessor A	31/01/2021

Commentary

Candidate demonstrates an excellent understanding for the safe isolation and carried out all the necessary steps in the safe isolation lock off and tag process, as identified in their written report. The candidate referred to the method statement once and then carried out all the steps correctly without further reference required. The candidate was able to describe in detail the reasoning behind each the step in the process. The candidate used all the correct terminology

for the testing equipment and explained what each check was proving before moving to next stage.

Candidate evidence

Task 2 – Installation of components

Practical Observation Form

Assessment ID	Qualification number
8710-357	8710 – 31
Candidate name	Candidate number
Candidate A	CG12345
Centre name	Assessment theme
City & Guilds	Health and safety, 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	<p>Candidate prepared the workspace with full consideration to health and safety and good housekeeping, putting dust sheets on the floor, collecting all the correct equipment and storing tools and materials in a safe location. Candidate maintained workspace cleanliness and adhered to the risk assessment throughout the installation.</p> <p>Candidate detailed any pre-existing marks or damage to the wall prior to marking out for their installation.</p> <p>Candidate set about the task in a highly organised manner and prefabricated lengths of conduit and trunking to ensure accuracy, consistency and efficiency.</p> <p>Candidate prepared the workspace using accurate clipping distancing to support the installation of conduit and cables. Attention was paid to aesthetics and ensuring containment is level/plumb and secured.</p> <p>All components were installed in the locations detailed in the dimensioned drawing and level and aesthetically pleasing. The external sounder, when measured, was not completely accurate and level.</p> <p>All cables were identified using suitable labels, ends were prepared and terminated correctly with no exposed conductors, and no damage to the insulation. Routing of cables inside the CIE was tidy and did not obstruct access to the CIE. All devices were installed and connected as per the system design specification.</p>

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.
	The installation was accurate and aesthetically pleasing.

Assessor signature	Date
Assessor A	31/01/2021

Photographic evidence Task 2 – Installation

Installation: Marking out (photograph 1)

Photo: i.e., Candidate using a tape measure and pencil to mark component positions

Image shows correct marking out of component locations.

Candidate uses the correct equipment for marking out.

Installation: Clipping (photograph 2)

Photo: i.e., Candidate using Pozidrive screwdriver to fit spacer bar saddle, with clear view of saddles in straight line.

Image shows the correct use/type of saddle/cable clips, equally spaced and installed in line.

Candidate used the correct tools for fixing the clips/saddles.

Installation: Cutting and preparing (photograph 3)

Photo: i.e., Candidate using a hacksaw to cut the conduit. Conduit is secured in a vice. Candidate is wearing appropriate PPE.

Image shows the accurate cutting of PVC conduit.

Correct PPE is being worn.
The conduit is secure in the vice.
The finished cut was straight.

The candidate de-burred the conduit end.

Installation: Components (photograph 4)

Photo: i.e., Candidate using a spirit level to check the CIE enclosure after fixing to the wall.

Image shows the candidate fixing the CIE enclosure to the wall correctly.

Candidate uses the correct hand tools for the installation and position and level checked for accuracy.

Installation: Components (photograph 5)

Photo: i.e., Candidate standing on a step-up, fixing a PIR detector case to the wall.

Image shows the candidate fixing a PIR case to the wall.

Candidate carefully and accurately measures the position for the fixing holes.

Candidate uses the correct size masonry drill bit for the plug.

Candidate uses the correct hand tools for the installation.

Installation: Cables (photograph6)

Photo: i.e., Close up detailing the completed cable installation and termination in the CIE.

Images show the completed CIE cable installation.

Cables are clearly labelled.
Cable termination is to industry standard.
Images show the completed CIE cable installation.

Cable routing is tidy and does not impede front cover fitting, or future servicing.
Within tolerances.

Commentary

Candidate demonstrates a thorough understanding of the installation requirements for the task. The candidate follows a highly methodical and logical process for the installation of system.

The candidate did not require reassurance and carried out the installation to specification requirements. Cable preparation and connection were accurate and the completed installation is to a high standard with a high degree of accuracy in measuring and cutting which has resulted in an installation that is aesthetically pleasing.

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Candidate evidence

Task 2 – Commissioning and handover

Practical Observation Form

Assessment ID	Qualification number
8710-357	8710 – 38
Candidate name	Candidate number
Candidate A	CG12345
Centre name	Assessment theme
City & Guilds	Inspection and testing of systems, reports/information and handover

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 and handover	<p>Commissioning checks</p> <p>Candidate performed a full visual inspection of the CIE wiring and connections before applying power and connecting the stand-by battery. During system programming, the candidate made excellent use of manufacturer’s programming instruction guides. The candidate referred to the original system specification to ensure that all programming was in accordance with the specification. A Record of Operational Checks was correctly completed and the candidate demonstrated clear knowledge and understanding whilst using a multimeter to carry out the required tests. Candidate placed the system into walk test mode and tested the system operation, as well as detector range, sensitivity, and coverage. Signaling equipment was tested. Upon completion of the walk test, the candidate performed a Full Set, Part Set and Unset of the system as well as an alarm activation and system reset.</p> <p>Handover to customer</p> <p>Candidate was well prepared for handover, making sure that all the required documentation was to hand. Communication with customer was conducted in a professional manner and was clearly articulated. Candidate interacted well with customer using eye contact and open body language, explaining everything and using terminology that is understandable to the customer and sought confirmation of understanding from client. Candidate walked the customer around their system, clearly explaining the function and coverage of all detectors and signaling equipment. Setting, Unsetting and Resetting of the system was demonstrated. The customer was invited to perform the operations to demonstrate the customer understood. The customer was made to set their own User PIN, at which point the candidate turned away to avoid learning their PIN. Handover documentation was completed correctly.</p>

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.
	The customer was made aware of the system warranty and how to contact the installation company in the event of any trouble with the system.

Photographic evidence Task 2 – Commissioning

Commissioning: System programming (photograph 7)

Photo: i.e., Close up showing candidate holding the system spec whilst using the CIE keypad to program the system. CIE display is visible showing a programming menu.

Images show candidate programming whilst referring to the system specification.

Candidate referred to the manufacturer's programming instructions.

On completion, all system programming met the system specification.

Commissioning: System measurements (photograph8)

Photo: i.e., Candidate with multimeter performing a system measurement.

Images show correct connection and setting of multimeter to measure the battery charging voltage

Commentary

The candidate demonstrated a thorough understanding of commissioning and completed the commissioning tests and checks required and programs the system as per the system specification. Commissioning tests are completed and follow a logical sequence. All voltage and resistance measurements using the multimeter were taken competently and correct values were recorded.

Reference was made to manufacturer's installation and programming instruction manuals at relevant stages during the task.

Handover and system demonstration with customer were accurate and detailed. The customer was taken around the system and the areas of coverage identified, with confirmation sought that the customer had fully understood throughout the handover.

During the handover process, at each part of the system training. the customer was asked to perform operations using the keypad to confirm that they were understanding the instructions.

Customer care skills were apparent with the use of positive interaction throughout.

Candidate evidence

Task 2 – Decommissioning

Practical Observation Form

Assessment ID	Qualification number
8710-357	8710 – 31
Candidate name	Candidate number
Candidate A	CG12345
Centre name	Assessment theme
City & Guilds	Health and safety, system 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.

Assessment theme	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 followed a logical sequence for decommissioning. All components are returned to their packaging, with instruction sheets in preparation for next use. Longer lengths of cable are suitably coiled and taped ready for next use. All re-useable items are retained and returned to store. Candidate ensured the working area was made good with the use of appropriate fillers and sands back completely resulting in a good quality surface before applying a top coat of paint to restore the work area to pre-installation condition.

Assessor signature	Date
Assessor A	31/01/2021

Photographic evidence Task 2 – Decommissioning

Decommissioning: Component removal and recovery (photograph 9)

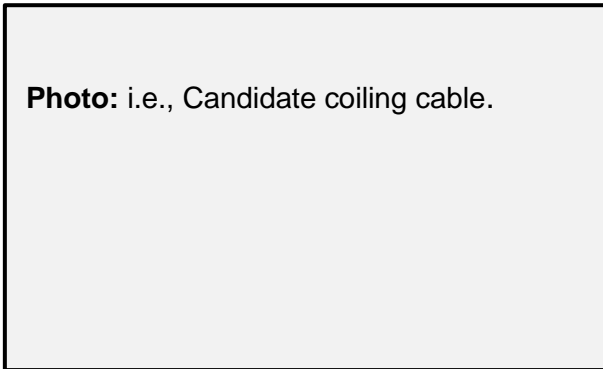


Image shows candidate ensuring that, all possible materials are re-used.

Decommissioning: Component removal and recovery (photograph 10)

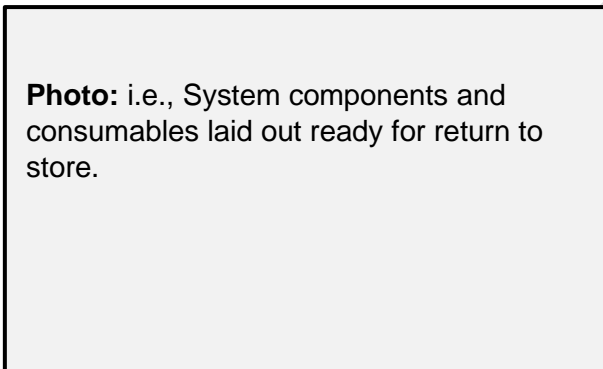


Image shows components are removed carefully and prepared for storage. Consumables are removed and stored so that they may be re-used.

Decommissioning: Surface restoration (photograph 11)

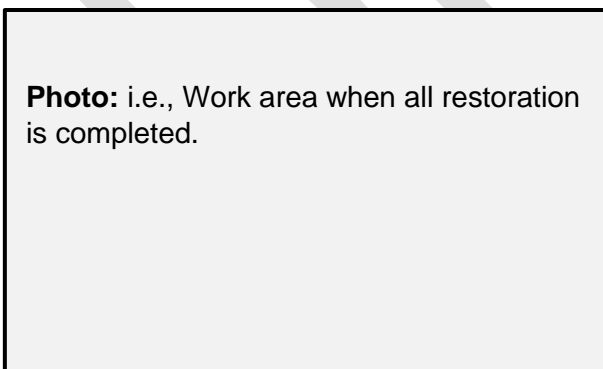


Image shows work restored with paint to pre-installation condition.

Commentary

The candidate demonstrates a thorough understanding of the decommissioning process and demonstrates an ability to sequence task logically whilst decommissioning a system.

The candidate correctly identifies all of the components that can be reused.

The candidate began by ensuring that the 230 V electrical supply was isolated, using the correct procedure, before removing the supply cable connecting the fused spur outlet to the CIE.

Process for safe disposal of waste was carried out with consideration to customer property.

All components were recycled correctly.

The candidate made good the working area with the use of appropriate fillers and sanding and completing with a top coat of paint, all to a high standard.

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Task 3 – Carry out maintenance

(Assessment themes: Health and safety, working with faults, design and planning, systems and components, reports and information)

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

- Diagnose a single fault for I&HAS components
- Produce a written report of maintenance activity
- Produce a written report detailing cause of problem and work required to repair the fault
- Customer handover.

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

- A written report of maintenance activity
- Assessor observations
 - Fault diagnosis
 - Rectification of fault
 - .

The following Task 3 candidate assessment requirements have not been included as example candidate evidence for this version of the guided exemplification materials:

- Assessor observation of handover to customer.

Photographic evidence:

- Candidate using RKP to interrogate the system (**photograph 12**)
- Candidate using a suitable test instrument to diagnose the fault (**photograph 13**)
- Candidate replacing the defective component / cable (**photograph 14**)

Candidate evidence not included as part of this GSEM:

- Assessor observation of Handover to customer

Candidate evidence

Task 3 - Written report of maintenance activity

Maintenance activity report: Practical diagnosis and rectification checklist

Fault Report: Unable to Set the I&HAS

Description of fault diagnosis

I first asked the customer to explain to me the nature of the problem. I then attempted to Set the system, noting the error message on the keypad display, which indicated which detection circuit was at fault.

Using a multimeter I was able to confirm that the circuit was open, which is the reason for the system not setting.

I checked the system records to find where in the premises the detector was located, and then went and visually checked the detector, which looked to be OK. The walk test light was also coming on, which indicated that some power was getting to it. So I removed the detector cover and tested resistance of the Alarm Output on the detector, which proved to be open circuit. This proves that the detector is faulty.

Possible solutions

The only way to repair the fault is to replace the detector. However, if we do not replace it with the identical type, then there may be marks on the wall where the old casing had been, which would not look good in the customer's home. So, until a new device of the same type has been obtained, I may have to link out the circuit in the control panel to enable the system to be set. However, I must inform the customer in writing of the reduction in coverage during the time that the detector is out of service. The customer must agree to this course of action by signing the notification.

If the customer is not happy with this course of action, my only other option is to fit a detector of a different type, temporarily, until the correct type is available.

Actions taken to rectify fault

To replace the detector, I carried out the following sequence

- Disconnect the 12V supply to the detector at the control panel.
- Remove the faulty detector PCB from the back cover and replace it with the PCB from the new device (not removing the back cover from the wall prevents any damage to the decoration).
- Make a note of the wiring colours before disconnecting them from the old PCB.
- Connect the wires to the new PCB.
- Check that the Sensitivity, Walk Test LED and Pulse Count links in the new device are set to the same positions as they were in the old device.
- Clean up any mess or dirt from the work area.
- Replace the cover and re-connect the 12V supply at the control panel.
- Please the control panel into Walk Test mode and check the detector for functionality, sensitivity and coverage.
- Set the system and generate an alarm condition from the detector.
- Demonstrate to the customer that the system is now working.

Commentary

The candidate demonstrates thorough understanding of the maintenance requirements for the given task and provides a clear and detailed description of the fault diagnosis process. The process used to diagnose the defective component was sound and is supported by reasoning. This indicates a thorough understanding of I&HAS, electrical principles, and the use of a multimeter. The candidate obtained a written consent from the customer to temporarily degrade the system coverage whilst a replacement component was obtained. Prior to disconnection of the PIR, the candidate used their mobile phone to take a clear photograph of the detector wiring to ensure they could correctly connect the new device. After fitting the new device, the candidate ensured that the Pulse Count, LED, and lens range settings matched those of the old PIR. On completion of PIR replacement, the candidate cleaned the cover using a suitable cleaning agent and cloth. Full consideration was given to the aesthetics during removal and replacement.

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Candidate evidence

Task 3 – Diagnosis and rectification of faults

Practical Observation Form

Assessment ID	Qualification number
8710- 357	8710 – 31
Candidate name	Candidate number
Candidate A	CG12345
Centre name	Assessment themes
City & Guilds	Working with faults

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)	<p>Candidate displays excellent customer interaction with positive body language and asked appropriate questions using good eye contact and body language that put the customer at ease</p> <p>Candidate made good use of the system display to determine the defective circuit. Also confidently performed a logical sequence of electrical tests to identify the faulty component.</p> <p>The candidate selected an appropriate repair method and was focused and methodical in their approach to the maintenance repair, carrying out the task accurately. The candidate explained in full the process that they would carry and without damage to customer property.</p>
(Fault rectification)	<p>Candidate implemented all the health and safety preparations required to take care of components and customer property.</p> <p>Candidate follows a methodical and logical sequence, correctly isolating the DC supply to the detector, not removing the rear casing from the wall and checking the wiring convention before disconnection.</p> <p>The candidate completed the repair efficiently without error and in good time, testing the completed repair.</p>

Assessor signature	Date
Assessor A	31/01/2021

Photographic evidence Task 3 - Maintenance

Maintenance: Fault diagnosis (photograph 12)

Photo: i.e., Candidate using Keypad and noting the display.

Image shows candidate using correct techniques to diagnose faults using Keypad information correctly to determine the defective circuit.

Maintenance: Test equipment (photograph 13)

Photo: i.e., Candidate using suitable test equipment to diagnose fault

Image shows candidate using a multimeter correctly to test the loop resistance of the alarm cable.

Maintenance: Fault rectification (photograph 14)

Photo: i.e., Candidate on step-up re-connecting the new PIR PCB.

Image shows candidate rectifying fault, using correct equipment to access the detector and using correct tools to perform the repair correctly with clear attention to the customer's premises.

Commentary

The candidate demonstrated an excellent understanding of fault diagnosis and rectification. The candidate was able to apply excellent professional discussion with the customer, maintaining eye contact and open body language throughout. Candidate asked appropriate questions to determine the cause of the fault.

The fault diagnosis and repair tasks followed a methodical order. The candidate was able to work independently throughout the tasks which were performed to an excellent standard with full attention given to the customer's premises.

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