T Level Technical Qualification in Building Services Engineering for Construction

8710-353 Electrotechnical Engineering

Grade standard exemplification material

Distinction - Summer 2024

Version 1-0

Version and date	Change detail	Section	Question
v1-0 October 2024			

Contents

Introduction

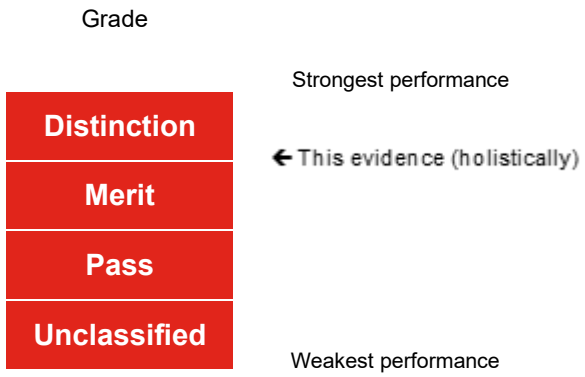
Summer 2024 Results

This document is aimed at providers and candidates to help understand the standard that was required in the summer 2024 assessment series to achieve a distinction grade for the 8710-353 Electrotechnical Engineering Occupational Specialism (OS).

The grade standard exemplification evidence (Grade SEM) provided for the distinction grade displays the holistic standard required across the tasks to achieve the distinction grade boundary in the summer 2024 series.

The aim of these materials is to provide examples of knowledge, skills and understanding that attested to distinction competence in summer 2024. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and standard of performance will vary across tasks.

The Occupational Specialism is graded Distinction, Merit, Pass or Unclassified.



The distinction grade boundary is based on a synoptic mark across all tasks. The materials in this Grade SEM are separated into two sections as described below. Materials are presented against a number of tasks from the assignment.

Task

This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photograph/video evidence. Candidate evidence that was or was not included in this Grade SEM has also been identified within this section.

In this Grade SEM there is candidate evidence from:

Task 1
Task 2
Task 3

Candidate evidence

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

The Occupational Specialism brief and tasks can be downloaded from here:

8710-353_electrotechnical_engineering_Summer24_v1-0

Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that candidates and teachers are less familiar with the assessments (grading-arrangements-for-vtqsand-technical-qualifications-within-t-levels-in-the-academic-year-2023-to-2024), whilst also recognising the standards required for these qualifications.

- The evidence presented, as a whole, was sufficient to achieve the distinction grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than a distinction grade).

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.

Locate and identify faults, diagnose their causes and have a thorough understanding and the skills to be able to repair and rectify them.

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

Task 1 – Planning the installation

Assessment number (eg 1234-033)	8710-353
Assessment title	Electrotechnical Engineering Occupational Specialism

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

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

Task(s)	1
Evidence title / description	• Completed design grid showing calculations • Completed assessment of general characteristics form • Completed earth fault loop impedance schedule • Completed materials take-off sheet
Date submitted by candidate	DD/MM/YY

Task

Assessment themes:

- Health and safety
- Design and planning
    - Documentation
    - Technical information
- Reports and information

a) Complete the design grid in **Figure 3**. Any assumptions made in order to complete the design must be listed on a separate sheet with justifications.

b) Complete the assessment of general characteristics form in **Figure 4**, detailing what requires an assessment for this installation.

c) Complete the earth fault loop impedance schedule in **Figure 5** based on the design drawings in **Figures 1** and **2**, and the installation design schedule in **Figure 3**.

d) Complete the material take off sheet in **Figure 6** based on the installation drawings in **Figures 1** and **2** and your design grid **Figure 3**.

What the candidate must produce for marking:

- Completed design grid (**Figure 3**) showing calculations
- Completed assessment of general characteristics form (**Figure 4**)
- Completed earth fault loop impedance schedule (**Figure 5**)
- Completed materials take-off sheet (**Figure 6**)

Additional evidence of candidate performance that must be captured for marking:

- Tutor/assessor's notes of the candidates referencing and research describing the methods used to reference or research information and how information was used or processed.

Candidate evidence

Completed Design Grid

Consumer unit located in workshop VOLTAGE DROP TO COMPLY WITH BS 7671		Nominal Voltage (U/Uo) 230 V		Earthing Arrangement TN-C-S		External Earth Fault Loop Impedance (Z_e) 0.11 Ω		
Circuit	1	2	3	4	5	6	7	
Description	Ring-final sockets West side of building	Ring-final sockets East side of building	Radial-final FCU for roller door motors 1 and 2 (west & centre)	Radial-final FCU for roller door motor 3 (East)	Air Compressor supply (to be located outdoors)	Lighting North side luminaire	Lighting South side luminaires	
No. outlets	5	5	2	1	1	5	7	
Type of wiring	70 ^{0}C thermoplastic single-core non-sheathed	70 ^{0}C thermoplastic single-core non-sheathed	70 ^{0}C thermoplastic single-core non-sheathed	70 ^{0}C thermoplastic single-core non-sheathed	90 ^{0}C thermosetting multi-core SWA	70 ^{0}C thermoplastic single-core non-sheathed	70 ^{0}C thermoplastic single-core non-sheathed	
Design Current (I_b)	20 A	20 A	12 A	6 A	12 A	545W/ 230v = 2.4 A	675/ 230v = 2.9 A	

Type and Nominal rating (I_n)	32 A B	32 A B	16 A C	16 A C	16 A B BSEN 61009	6A B BSEN 61009	6A B BSEN 61009	
Length (metres)	35 m loop	58 m loop	11m	22 m	29 m	18 m	32 m	
Installation method	B	B	B	B	C	B	B	
Ambient temperature ^0C	25 °C	25 °C	25 °C	25 °C	30 °C	30 °C	30 °C	
Rating Factor Ambient air temp. C_a	1.03	1.03	1.03	1.03	1	1	1	
Total circuits in group	2	2	2	2	1	1	1	

Rating factor grouping C_g	1	1	1	1	1	1	1	
Minimum current capacity ($<I_t$)	$\frac{32}{1.03 \times 1} = 31.07A$	$\frac{32}{1.03 \times 1} = 31.07A$	$\frac{16}{1.03 \times 1} = 15.5A$	$\frac{16}{1.03 \times 1} =$ 15.5A	$\frac{16}{1 \times 1} = 16A$	$\frac{6}{1 \times 1} = 6A$	$\frac{6}{1 \times 1} = 6A$	
mV/A/m	4 mm – pg 448 regs mV/A/m = 11	mV/A/m = 11	1.5 mm cable from pg 448, 29 mV/A/m	1.5 mm cable, 29 mV/A/m	1.5 mm SWA cable – 31 mV/A/m PG 465	13.5 current carrying capacity 1 mm cable 44 mv/A/m	mV/Am = 44	
Actual Voltage drop	$\frac{mv/A/m \times Ib \times lengt}{4000}$ $\frac{11 \times 20 \times 35}{4000}$ $= 1.925VD$	$\frac{11 \times 20 \times 58m}{4000} = 3.19VD$	$\frac{29 \times 12 \times 11m}{1000} = 3.8VD$	$\frac{29 \times 12 \times 22m}{1000} = 7.6VD$	$\frac{31 \times 12 \times 29m}{1000} =$ 10.79VD	$\frac{44 \times 0.3 \times 18m}{1000} =$ 1.9VD Complies with lighting max of 6.9VD	$\frac{44 \times 2.9 \times 32m}{1000} = 4VD$	

Minimum conductor csa mm^2	4 mm^2	4 mm^2	1 mm^2	1 mm^2	1.5 mm^2	1 mm^2	1 mm^2	

Commentary for Circuit 1:

1.) For the first ring final circuit on the west side of the building, a 35m loop of cable was used, it was installed in steel trunking which makes the method of installation B, the ambient temperature being 25° celsius makes the rating factor of ambient temp 1.03 which I gathered from table F1 in the on-site guide.

2.) I used the already given value of circuit grouping to measure the tabulated current for the circuit which I found on page 167 of the on-site guide, where the formula for tabulated current-capacity is shown. I placed the nominal current of the circuit into this formula, divided by the two grouping factors multiplied together and this is the result that I got

$$\frac{32}{1.03 \times 1} = 31.07A$$

3.) I then used this reading of 31.07 Amps in correlation to page 448 in the BS 7671 Requirements for Electrical Installations book, as the cable for this circuit is 70°C thermoplastic single-core insulated cable with no sheath, I looked at the table under reference method B as the circuit is enclosed in trunking and found that $4mm^2$ cable can carry 32A of current which would work for this ring circuit.

4.) This $4mm^2$ cable has a mV/A/m factor of 11 as shown in table 4DB1 of BS7671, I then used the volt drop formula of $\frac{mv/A/m \times Ib \times length}{4000}$ to find the actual volt drop, due to the circuit being on a ring wiring system, I used 4,000 as the denominator as there are two pairs of cables coming out and back in to the consumer unit. After putting my values into the volt drop formula I recieved the value 1.925 volts of volt drop in the circuit which is well under the maximum volt drop value of 11.5 volts.

5.) I found the minimum conductor size for this circuit on page 448 of BS7671, which is $4mm^2$ due to the nominal rating of the circuit.

Commentary for Circuit 2:

1.) For the second ring final circuit on the east side of the building, many of the calculations were very similar, a 41m loop of cable was used, which I found based off the building plan in figure 1, I measured out the values and made sure to use the 1:50 scale correctly, I also made sure to measure an additional 3m of cable for each drop from the trunking to the 2 gang 13A socket outlets as this is what the drop and return was in the first circuit. So in total the ring was 58m in length, which is acceptable as the maximum length for an A1 circuit is 100m as seen in table H2.1 in the on site guide This circuit was also installed in steel trunking which makes the method of installation B, the ambient temperature being the same 25° celsius makes the rating factor of ambient temp 1.03 which I gathered from table F1 in the on-site guide.

2.) The circuit grouping value remained the same and I used that to measure the tabulated current for the circuit which I found on page 167 of the on-site guide, where the formula for tabulated current-capacity is shown. I placed the nominal current of the circuit into this formula, divided by the two grouping factors multiplied together and this is the answer I got $\frac{32}{1.03 \times 1} = 31.07A$

3.) very similarly to the first circuit, I used this reading of 31.07 Amps in correlation to page 448 in the BS 7671 Requirements for Electrical Installations book, as the cable for this circuit is 70°C thermoplastic single-core insulated cable with no sheath, I looked at table 4D1B under reference method B as the circuit is enclosed in trunking and found that $4mm^2$ cable can carry 32A of current which would work for this ring circuit.

4.) This $4mm^2$ cable has a mV/A/m factor of 11 as shown in table 4DB1 of BS7671, I then used the volt drop formula of $\frac{mv/A/m \times Ib \times length}{4000}$ to find the actual volt drop, due to the circuit being on a ring wiring system, I used 4,000 as the denominator as there are two pairs of cables coming out and back in to the consumer unit. However, this time the result was slightly higher due to the length of cable being 23m longer, After putting my values into the volt drop formula I recieved the value of 3.19 volts dropped in the circuit which is still well under the maximum volt drop value of 11.5 volts.

5.) I found the minimum conductor size for this circuit on page 448 of BS7671, which is $4mm^2$ due to the nominal rating of the circuit.

Commentary for Circuit 3:

1.) For the 3rd circuit, I measured 11m of cable would have to be used through the conduit which makes the method of installation B, the ambient temperature being 25° celsius makes the rating factor of ambient temp 1.03 which I gathered from table F1 in the on-site guide.

2.) I used a grouping value of to measure the tabulated current for the circuit which I found on page 167 of the on-site guide, where the formula for tabulated current-capacity is shown. I placed the nominal current of the circuit into this formula, divided by the two grouping factors multiplied together and this is the result that I got $\frac{16}{1.03 \times 1} = 15.5A$

3.) I then used this reading of 15.5 Amps in correlation to page 448 in the BS 7671 Requirements for Electrical Installations book, as the cable for this circuit is 70°C thermoplastic single-core insulated cable with no sheath, I looked at the table under reference method B as the circuit is enclosed in trunking and found that $1.5mm^2$ cable can carry 17.5A of current.

4.) This $1.5mm^2$ cable has a mV/A/m factor of 29 as shown in table 4DB1 of BS7671, I then used the volt drop formula of $\frac{mv/A/m \times Ib \times length}{1000}$ to find the actual volt drop, After putting my values into the volt drop formula I recieved the value 3.8 volts of volt drop in the circuit which is well under the maximum volt drop value of 11.5 volts for this circuit

5.) I found the minimum conductor size for this circuit on page 448 of BS7671, which is $1mm^2$ due to the design current being 12 on this circuit.

Commentary for Circuit 4:

1.) For circuit 4, I measured 22 meters of cable would have to be used through the conduit which makes the method of installation B, the ambient temperature being 25° celsius makes the rating factor of ambient temp 1.03 which I gathered from table F1 in the on-site guide.

2.) I used a grouping value of to measure the tabulated current for the circuit which I found on page 167 of the on-site guide, where the formula for tabulated current-capacity is shown. I placed the nominal current of the circuit into this formula, divided by the two grouping factors multiplied together and this is the result that I got $\frac{16}{1.03 \times 1} = 15.5A$

3.) I then used this reading of 15.5 Amps in correlation to page 448 in the BS 7671 Requirements for Electrical Installations book, as the cable for this circuit is 70°C thermoplastic single-core insulated cable with no sheath, I looked at the table under reference method B as the circuit is enclosed in trunking and found that $1.5mm^2$ cable can carry 17.5A of current which would safely carry the current in our circuit.

4.) This $1.5mm^2$ cable has a mV/A/m factor of 29 as shown in table 4DB1 of BS7671, I then used the volt drop formula of $\frac{mv/A/m \times Ib \times length}{1000}$ to find the actual volt drop, After putting my values of 29mV/A/m, 6A Ib, and 22m of cable length divided by 1000 into the volt drop formula I recieved the value 7.6V of volt drop in the circuit which is well under the maximum permissable volt drop value of 11.5 volts for this circuit

5.) I found the minimum conductor size for this circuit on page 448 of BS7671, which is 1mm due to the design current being 6 on this circuit.

Commentary for Circuit 5:

1.) Circuit 5 is located outdoors, therefore it would need mechanical protection to some degree, which is why 90 C multicore Steel Armoured Cable would have to be used. The 29m length of cable was already given to me to help me with calculations, and due to the design current being stated as 12 Amps, I decided to use a 16A B type 61009 RCBO circuit breaker due to them offerning additional protection to the circuit such as RCD capabilities as well as overload protection, although they are slightly more expensive that 60898 circuit breakers the added protection they offer is worth i, especially in an industrial setting.

2.) The ambient temperature being 30°C meant that an ambient temperature factor from table F1 had to be used. I used the provided grouping value of 1 measure the tabulated current for the circuit which I found on page 167 of the on-site guide, where the formula for tabulated current-capacity is shown. I placed the nominal current of 16A into formula, divided by the two grouping factors multiplied together and this is the result that I got $\frac{16}{1\times1} = 16$ Obviously the result stayed the same as my two correctional factors were 1.

3.) I then used this reading of 16 Amps in correlation to page 464, table 4E4A in the BS 7671 Requirements for Electrical Installations book, as the cable for this circuit is 90°C thermosetting multicore armoured and insulated cable, I looked at the table under reference method C as the cable is clipped direct and found that the smallest size of SWA - $1.5mm^2$ cable can carry 27A of current which is more than enough for this circuit.

4.) This 1.5mm cable has a mV/A/m factor of 31 as shown in table 4E4B of BS7671, page 465, I then used the volt drop formula of $\frac{mv/A/m \times Ib \times length}{1000}$ to find the actual volt drop, After putting my values of 29mV/A/m, 12A Ib, and 29m of cable length divided by 1000 into the volt drop formula I recieved the value 10.79V of volt drop in the circuit which is still under the maximum permissable value of 5% of 230V, or 11.5V.

5.) I found the minimum conductor size for this circuit on table 4E4A on page 464 of BS7671, which is 1.5mm due to the design current being 12A on this circuit and $1.5mm^2$ being the smallest conductor for 90°C thermosetting multicore armoured and insulated cable.

Commentary for Circuit 6:

1.) Circuit 6 is a lighting circuit that powers all of the lights on the northern side of the building, there are 5 lights controlled on this one circuit, one of them is the 65W LED outdoor flood light luminaire, and the other four are 120W Hi-bay LED luminaires inside of the building. I added together the watts from all of these lights which came out at 545 and then divided this value by 230V, which gave me a design current of 2.4A, meaning the circuit should be placed on a 6A B type breaker, I decided that a C type breaker would be unnecessary as there are no flourescent lightings present in the circuit. I measured the run of cable as 18m including a drop down to the switch.

2.) The ambient temperature being 30°C meant that an ambient temperature factor from table F1 of 1Ca had to be used. I used the provided grouping value of 1 measure the tabulated current for the circuit which I found on page 167 of the on-site guide, where the formula for tabulated current-capacity is shown. I placed the nominal current of 6A into the formula, divided by the two grouping factors multiplied together and this is the result that I got $\frac{6}{1\times1} = 6A$

Obviously the result stayed the same as my two correctional factors were 1.

3.) I then used this reading of 6Amps in correlation to page 448, table 4D1A in the BS 7671 Requirements for Electrical Installations book, as the cable for this circuit is70 ^{0}C thermoplastic single-core non-sheathed $1mm^2$ cable, I looked at the table under reference method B as the cable is enclosed within trunking as well as conduit. I found that 1mm cable has a current carrying capacity of 13.5 A under these conditions and therefore Decided to use 1mm cable.

4.) The $1mm^2$ cable has a mV/A/m factor of 44 as shown in table 4D1B page 449 of the BS7671 of the wiring regs book, I then used the volt drop formula of $\frac{mv/A/m \times Ib \times length}{1000}$ to find the actual volt drop, After putting my values of 44mV/A/m, 6A Ib, and 18m of cable length divided by 1000 into the volt drop formula I recieved the value 1.9V of volt drop in the circuit which is still under the maximum permissable value of 3% of 230V, or 6.9V because this is a lighting circuit.

5.) I found the minimum conductor size for this circuit on table 4D1A of page 448 in the BS7671 regs book which is $1mm^2$ in accordance to the current carrying capacity of this cable being 13.5 A in comparison to the design current being 2.4A which is well under the maximum current carrying capacity.

Commentary for Circuit 7:

1.) Circuit 7 is teh second lighting circuit which is responsible for the lights on the south side of the building, there are 7 lights in total being powered by this circuit, three 65W LED outdoor flood light luminaires, and four 120W Hi-bay LED luminaires. I added together the watts from all of these lights which came out at 675 watts in total I then divided this value by the nominal current of 230V, which gave me a design current of 2.9A, therefore I placed the circuit on a 6A BSEN 61009 breaker. I measured the run of cable as 32m including a drop down to the switch.

2.) The ambient temperature being 30°C meant that an ambient temperature factor from table F1 of 1Ca had to be used. I used the provided grouping value of 1 measure the tabulated current for the circuit which I found on page 167 of the on-site guide, where the formula for tabulated current-capacity is shown. I placed the nominal current of 6A into formula, divided by the two grouping factors multiplied together and this is the result that I got $\frac{6}{1 \times 1} = 6A$ The result stayed the same as my two correctional factors were 1.

3.) I then used this reading of 6Amps in correlation to page 448, table 4D1A in the BS 7671 Requirements for Electrical Installations book, as the cable for this circuit is 70 ^{0}C thermoplastic single-core non-sheathed $1mm^2$ cable, I looked at the table under reference method B as the cable is enclosed within trunking. I found that 1mm cable has a current carrying capacity of 13.5 A under these conditions and therefore decided to use 1mm cable.

4.) The $1mm^2$ cable has a mV/A/m factor of 44 as shown in table 4D1B page 449 of the BS7671 of the wiring regs book, I then used the volt drop formula of $\frac{mv/A/m \times Ib \times length}{1000}$ to find the actual volt drop, After putting my values of 44mV/A/m, 6A Ib, and 32m of cable length divided by 1000 into the volt drop formula I recieved the value 4V of volt drop in the circuit which is under the maximum permissable value of 3% of 230V, or 6.9V due to it being a lighting circuit.

5.) I found the minimum conductor size for this circuit on table 4D1A of page 448 in the BS7671 regs book which is $1mm^2$ in accordance to the current carrying capacity of this cable being 13.5 A in comparison to the design current of 2.9A which is well under the maximum current carrying capacity.

North Lights

4x120w
1x65w

$= \frac{545w}{230v} = 2.4A$

length in m $4+1+3+1+3+15+7 = 21$

South Lights

$\frac{675w}{230v} = 2.9A$

$1+6+1+6.5+3+9+9+9+9+9+2$

50x50 lighting trunking – 41.6 cm on paper

20.8m in real

20mm steel conduit – 3.4cm × 3 = 10.2cm ÷ 2 = 5.1m

75x50mm trunking – 40.3 – 20.15m in real

3.3cm ÷ 2 = 1.65m

13.2 + 5.8 + 10.2 = 29.2 / 2 = 29.2m

South side lights = 41.8cm / 2 = 20.9m

15 × 9.6 + 14 × 2 =

1 + 2.8 + 1 + 6.6 + 3 + 4.3 + 2m

W+S motor radial

+ 4.3 + 9.1 + 4.3 + 3 = 41.2

20.6m

South lights

57.8cm / 2 = 28.5m

+ 3 + 9 + 9 + 4.3 + 3

19.75m for south motor

Circuit 3 – 1.5mm² cable – 17.5A

29mV/A/m

C_4 = 29mV/A/m

C5 90° SWA thermoset – Table 4E4A pg 464

31mV/A/m from pg 465

Completed assessment of general characteristics

Make an assessment of all impacts on the installation as detailed in Chapters 31 – 36 of BS 7671.

No.	What has an impact on the installation	Any relevant regulation number and/or code number from Appendix 5	Actions required due to the impact identified
eg. 1	Impact damage to wiring system and enclosures	Chapter 32 Code AG3	Use metallic wiring systems to protect cables and metal-clad socket-outlets and switches.
1.	Incorrect maximum demand and diversity and conductor arrangement, system earthing will make the installation	Chapter 31	The arrangement of current carrying capacitors should be assessed under normal operating conditions as well as the type of system earthing, ensuring that the correct wiring is used in terms single phase or three phase systems. Circuits should also be divided suitably so that one circuit doesn't hld too much current and potentially cause a fault.

	potentially unreliable and not as economic.		
2.	Electromagnetic interference on other devices	Chapter 33 332	Ensure that all equipment being installed meets the proper EMC requirements and meets the EMC standards, the designer should consider installation methods which will reduce the amount of electromagnetic interference.
3.	The maintainability of the new installation	Chapter 34	Ensure that the person responsible for keeping the new equipment maintained is aware of their role and that periodic inspection and testing is carried out. Equipment must also be deemed suitable in accordance to its purpose and intended life. Ensure that protective measures do not diminish during the life of the installation.
4.	The safety services deteriorating and needing inspection	Chapter 35 Regulation 560.4	Services such as escape lighting, fire alarm systems etc must be frequently regulated by statutory authorities whose requirements have to be observed.

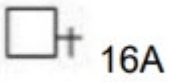
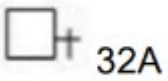
5.	Continuity of service	Chapter 36	Consider the method of earthing, multiple power supplies, the number of circuits and selection of protective device to ensure that power supplied to the new installation is constant and that there will be no prolonged periods without power.

Completed Earth Fault Loop Impedance Schedule

Circuit	Protective device	Circuit length	R_1+R_2 at operating temperatures	Z_s	Maximum permitted Z_s (BS7671)	Calculations/comments
1. Ring final circuit West side socket-outlets	32 A B Type BS EN 61009	35 m loop	9.4 Ω	0.2 Ω	1.37 Ω	I used table I1 in the On-Site Guide page 218 to work put my R1 + R2 values, I got the value for 4mm cable which is 9.22 for copper conductors, I applied the ambient temperature factor of 1.02 as this circuit will operate at 25 C to give me a reading of 9.4 and used the formula $\frac{9.4 \times 35m \times 1.2}{4000}$ I used a denominator of 4000 as this is a ring circuit. This gave me a value of 0.09. I added this value to the Ze of the circuit which is 0.11 Ohms to get a Zs value of 0.2Ω. I then checked my Zs reading against the maximum allowed on page 68 table 41.3 in the BS 7671 regs book under B type 32A breakers which showed me a value of 1.37 Zs meaning my value was within the acceptable range.

4. Radial-final door supply FCU on east side door	16 A C Type BS EN 61009	22 m	24.6 Ω	0.75 Ω	1.37 Ω	For this circuit, 1.5mm cable was used therefore I used the factor of 24.2 Ohms from table I1 on page 218 of the on site guide, I again used the formula to find R1+R2 $\frac{24.2\times22m\times1.2}{1000}$ This time I divided by 1000 as it is a radial circuit. I got a value of 0.64Ω from this and and ambient temperature multiplier was 1.02 as the temperature is 25. I added the Ze for the circuit which is 0.11 Ohms to this value to get a Zs of 0.75 Ohms. I then checked the Zs value that I got compared to the max Zs shown in the Regs book in table 41.3 on page 68 under type C circuit breakers, the max Zs reading on this page is 1.37 Ohms which means my reading is within the allowance.

Completed Materials Take off Sheet (relating to Figures 1, 2 and 3)

Symbol	Description	Quantity
	Consumer Unit – 1.5m above ffl	1
	120 W Hi-bay LED luminaire	8
	Fused switch 16A SP-N Hoist	3
	Fused Switch 32A SP-N machine	1
	Fused Switch 20A SP-N heating	1

	Multi-gang light switch	1
	2-gang 13 A switched socket outlet	10
	1-Gang 13 A switched FCU for door motor supplies (6A per unit)	3
	65 W LED outdoor flood light luminaire	4
	20mm steel conduit	6.6m

	50mm x 50mm lighting trunking suspended 500mm from roof support girders	26.7m
	75mm x 50mm steel trunking 1000mm above ffl with all equipment / accessories mounted below	25.85m
	70 °C thermoplastic single-core non-sheathed Single earth cable 4mm^2	93m
	70 °C thermoplastic single-core non-sheathed Single neutral cable 4mm^2	93m
	70 °C thermoplastic single-core non-sheathed Single live cable 4mm^2	93m
	70 °C thermoplastic single-core non-sheathed Single earth cable 1.5mm^2	33m
	70 °C thermoplastic single-core non-sheathed Single neutral cable 1.5mm^2	33m
	70 °C thermoplastic single-core non-sheathed Single live cable 1.5mm^2	33m
	90 °C thermosetting multi-core SWA 1.5mm^2	29m
	70 °C thermoplastic single-core non-sheathed Single earth cable 1 mm^2	50m
	70 °C thermoplastic single-core non-sheathed Single neutral cable 1 mm^2	50m

	70 °C thermoplastic single-core non-sheathed Single live cable 1 mm^2	50m
	Metal clad back boxes	19
	Brass brush and adapters	21
	Roundhead screws	160
	Metal spacer bar and saddle	80
	Penny washers	4

Practical Observation (PO) Form (Task 1)

8710-33 T Level Technical Qualification in Building Services Engineering for Construction

8710-353 Electrotechnical Engineering (Summer 2024)

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

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

Task 1 assessment themes:

- Health and safety
- Design and planning
  - Documentation
  - Technical information
- Reports and information

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

Assessment Themes	Assessor observation notes
Health and safety **(Related to planning the installation)**	Worked in a safe manner during the planning assessment.

Design and planning (use of documentation)	Good use of resource materials for factors in calculations on design grid – mV/A/m, mΩ/ m, etc. Scale from drawings converted effectively to estimate cable lengths. Strong understanding of electrical formulae shown.
Design and planning (use of technical information)	Very good effort made on assessment of general characteristics document showing use of resources to locate information with BS7671:2018. Earth loop impedance calculations completed with excellent explanation of reasoning throughout.
Reports and information (Related to planning the installation)	Documentation structured clearly to identify referencing for various elements on design grid. Completed to a very high standard. Excellent use of formulae on design grid and earth loop impedance sheets. Materials take off sheet is comprehensive and shows a high level of knowledge of electrical systems.

Any other aspects

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

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

Task 2 Installation, commissioning and decommissioning

Assessment number (eg 1234-033)	8710-353
Assessment title	Electrotechnical Engineering Occupational Specialism

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

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

Task(s)	2
Evidence title / description	• Photographs of the installation process (at the stipulated stages of the work - see centre guidance for details). • Completed Electrical Installation Certificate and associated documents.
Date submitted by candidate	DD/MM/YY

Task

Assessment themes:

- Health and safety
- Systems and components
    - Documentation
    - Technical information
- Reports and information
- Inspecting and testing of systems and components
- Handover and communication

a) Installation

Candidates must:

- Complete the installation in accordance with the drawing (**Figure 7**) and to the dimensions agreed with your tutor/assessor.

All cables and wiring systems **must** be terminated and installed in accordance with BS 7671. All terminations, joints and couplings must be mechanically secure and electrically continuous where applicable. Wastage must be minimised as far as possible.

b) Inspection, testing and commissioning

Candidates must:

- Carry out safe isolation to the distribution board prior to commencement of the installation
- Carry out an inspection and complete the inspection schedule for initial verification.
- Carry out the full range of applicable tests, in the correct sequence, to the completed installation. Permission must be obtained from the tutor/assessor before proceeding with any tests involving switching on the supply.
- Use instruments safely and in accordance with manufacturer's information and HSE GS38.
- Complete a schedule of test results for the results obtained.
- Compare results with BS 7671 and design criteria.
- Complete the Electrical Installation Certificate for this installation.
- Carry out a handover of the installation assuming your tutor/assessor to be your client including the operation of the electrical system.

All work must be to current standards and carried out in accordance with all health and safety requirements. Any unsafe actions will result in termination of this assessment.

The tutor/assessor must be satisfied that the work complies with BS 7671 and is electrically safe prior to the circuits being energised and tested for function.

c) Decommissioning

Once the installation has been completed, checked and verified by the client (tutor/assessor) candidates must:

- Decommission in a safe manner ensuring safe isolation.
- Ensure the workspace is made good, including filling, sanding and painting any holes or damage to the building fabric.
- Undertake a professional discussion with the client (tutor/assessor) on the correct methods for recycling or disposing of waste.

What the candidate must produce for marking:

- Completed Electrical Installation Certificate and associated documents.

Additional evidence of candidate performance that must be captured for marking:

- Tutor/assessor feedback on performance
- Photographs of the installation process (at the stipulated stages of the work - see centre guidance for details).
- Installed components are to be installed to required standards, with photographic evidence confirming accuracies and attention to details.
- Digital recording of decommissioning professional discussion

Candidate evidence
Completed Electrical Installation Certificate

ELECTRICAL INSTALLATION CERTIFICATE
(REQUIREMENTS FOR ELECTRICAL INSTALLATIONS - BS 7671)

Certificate No.: S323A

DETAILS OF THE CLIENT
[redacted]

INSTALLATION ADDRESS
[redacted]

DESCRIPTION AND EXTENT OF THE INSTALLATION
Description of installation:

New installation ☑

Extent of installation covered by this Certificate:

Addition to an existing installation ☐

Alteration to an existing installation ☐

(Use continuation sheet if necessary) See continuation sheet No: .....

FOR DESIGN
I/We, being the person(s) responsible for the design of the electrical installation (as indicated by my/our signatures below), particulars of which are described above, having exercised reasonable skill and care when carrying out the design, hereby CERTIFY that the design work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with BS 7671:2018, amended to ..... (date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120.3, 133.1.3 and 133.5):

Details of permitted exceptions (Regulation 411.3.3). Where applicable, a suitable risk assessment(s) must be attached to this Certificate.

Risk assessment attached ☐

The extent of liability of the signatory or signatories is limited to the work described above as the subject of this Certificate.

For the DESIGN of the installation: ..... **(Where there is mutual responsibility for the design)

Signature: ..... Date: ..... Name (IN BLOCK CAPITALS): ..... Designer No 1

Signature: ..... Date: ..... Name (IN BLOCK CAPITALS): ..... Designer No 2**

FOR CONSTRUCTION
I, being the person responsible for the construction of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the construction hereby CERTIFY that the construction work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671:2018, amended to 2022 (date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120.3 and 133.5):

The extent of liability of the signatory or signatories is limited to the work described above as the subject of this Certificate.

For CONSTRUCTION of the installation: .....

Signature: [redacted] Date: 29/04/24 Name (IN BLOCK CAPITALS): [redacted] Constructor

FOR INSPECTION AND TESTING
I, being the person responsible for the inspection & testing of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the inspection & testing hereby CERTIFY that the work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671:2018, amended to 2022 (date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120.3 and 133.5):

The extent of liability of the signatory or signatories is limited to the work described above as the subject of this Certificate.

For INSPECTION AND TESTING of the installation: [redacted]

Signature: [redacted] Date: 24/04/24 Name (IN BLOCK CAPITALS): [redacted] Inspector

NEXT INSPECTION

I/We, the designer(s), recommend that this installation is further inspected and tested after an interval of not more than 3 years/~~months~~.

Certificate No.: 53239

PARTICULARS OF SIGNATORIES TO THE ELECTRICAL INSTALLATION CERTIFICATE

Designer (No 1) Name: [redacted] Company: [redacted]
Address: [redacted] Postcode: [redacted] Tel No: [redacted]

Designer (No 2) (if applicable) Name: [redacted] Company: [redacted]
Address: [redacted] Postcode: [redacted] Tel No: [redacted]

Constructor Name: [redacted] Company: [redacted]
Address: [redacted] Postcode: [redacted] Tel No: [redacted]

Inspector Name: [redacted] Company: [redacted]
Address: [redacted] Postcode: [redacted] Tel No: [redacted]

SUPPLY CHARACTERISTICS AND EARTHING ARRANGEMENTS

Earthing arrangements	Number and Type of Live Conductors	Nature of Supply Parameters	Supply Protective Device
TN-C ☐	AC ☑ DC ☐	Nominal voltage, U / U_0 (1) 230 V	BS (EN) N/A
TN-S ☑	1-phase, 2-wire ☑ 2-wire ☐	Nominal frequency, f (1) 50 Hz	Type
TN-C-S ☐	2-phase, 3-wire ☐ 3-wire ☐	Prospective fault current, I_{pf} (2) 0.431 kA	Rated current A
TT ☐	3-phase, 3-wire ☐ Other ☐	External earth fault loop impedance, Z_e (2) 0.57 Ω	
IT ☐	3-phase, 4-wire ☐	(Note: (1) by enquiry (2) by enquiry or by measurement)	
	Confirmation of supply polarity ☑		

Other sources of supply (as detailed on attached schedule) ☐

PARTICULARS OF INSTALLATION REFERRED TO IN THE CERTIFICATE

Means of Earthing
Distributor's facility ☑
Installation earth electrode ☐

Maximum Demand
Maximum demand (load) 100 ~~kVA~~ / Amps (Delete as appropriate)

Details of Installation Earth Electrode (where applicable)
Type (e.g. rod(s), tape etc)
Location
Electrode resistance to Earth

Main Protective Conductors

Earthing conductor	Material Copper	csa 2.5 mm²	Connection / continuity verified ☑
Main protective bonding conductors	Material Copper	csa 10 mm²	Connection / continuity verified ☑

To water installation pipes ☑ To gas installation pipes ☐ To oil installation pipes ☐ To structural steel ☐ To lightning protection ☐
To other ☐ Specify

Main switch / Switch-fuse / Circuit-breaker / RCD

Location In distribution board
BS (EN) 60947
No of poles 2

Current rating 100 A
Fuse / device rating or setting 600 A
Voltage rating 415 V

If RCD main switch
RCD Type N/A
Rated residual operating current ($I_{\Delta n}$) mA
Rated time delay ms
Measured operating time ms

Schedule of Inspections

Item No.	Description	Outcome ✓ / N/A	Item No.	Description	Outcome ✓ / N/A
1.0	Condition of consumer's intake equipment (Visual inspection only)	✓	8.0	Circuits (Distribution and Final)	✓
			9.0	Isolation and switching	✓
2.0	Parallel or switched alternative sources of supply	N/A	10.0	Current-using equipment (permanently connected)	N/A
3.0	Protective measure: Automatic Disconnection of Supply (ADS)	✓	11.0	Identification and notices	N/A
4.0	Basic protection	✓	12.0	Location(s) containing a bath or shower	N/A
5.0	Protective measures other than ADS	✓	13.0	Other special installations or locations	N/A
6.0	Additional protection	✓	14.0	Prosumer's low voltage electrical installation(s)	N/A
7.0	Distribution equipment	✓			

COMMENTS ON EXISTING INSTALLATION (in the case of an addition or alteration see Regulation 644.1.2):

.....

.....

.....

.....

.....

.....

SCHEDULES

This Certificate is valid only when ..... Schedules of Circuit Details and Test Results are attached. (Enter quantities of schedules attached).

GENERIC SCHEDULE OF CIRCUIT DETAILS

Certificate/Report No.: 53234

Distribution board details

DB reference: DB2 Location: Bay 2 Supplied from: Mains

Distribution circuit OCPD: BS (EN): 61009 Type: — Rating/Setting: 100 A

SPD Details: Type(s)*: T1 ☐ T2 ☐ T3† ☐ N/A ☑

CIRCUIT DETAILS

1 Circuit number	2 Circuit description	Conductor details: 3 Type of wiring	4 Reference method‡	5 Number of points served	Number & size: 6 Live (mm²)	7 cpc (mm²)	Overcurrent protective device: 8 BS (EN)	9 Type	10 Rating (A)	11 Breaking capacity (kA)	12 Maximum permitted Z_s (Ω)§	RCD: 13 BS (EN)	14 Type	15 $I_{\Delta n}$ (mA)	16 Rating (A)
1	Ring Main Sockets	B	B	3	2.5	2.5	61009	B	32	6	1.61	61009	B	30	32
2	FCU Radial	B	B	1	2.5	2.5	61009	B	20	6	1.75	61009	B	30	20
3	Lighting	B/D	B	2	1.5	1.5	61009	B	6	6	5.87	61009	B	30	6
4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	Copper pipe bonding	B	B	1	N/A	10mm²	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

CODES FOR TYPES OF WIRING

A	B	C	D	E	F	G	H	O
Thermoplastic insulated/ sheathed cables	Thermoplastic cables in metallic conduit	Thermoplastic cables in non-metallic conduit	Thermoplastic cables in metallic trunking	Thermoplastic cables in non-metallic trunking	Thermoplastic SWA cables	Thermosetting SWA cables	Mineral insulated cables	Other - please state

* SPD Type. Where a combined T1 + T2 or T2 + T3 device is installed, indicate by ticking both Type boxes.

† Where a T3 SPD is installed to protect sensitive equipment, enter details in 'Remarks', column 31, of the Schedule of Test Results. (See Section 534 of BS 7671:2018+A2:2022.)

‡ See Table 4A2 of Appendix 4 of BS 7671:2018+A2:2022.

§ Where the maximum permitted earth fault loop impedance value stated in column 12 is taken from a source other than the tabulated values given in Chapter 41 of BS 7671:2018+A2:2022, state the source of the data in the

GENERIC SCHEDULE OF TEST RESULTS

Certificate/Report No.: S323A

Distribution board details

DB reference: DB2 Z_{db} 0.57 Ω I_{pf} 0.4 kA

Confirmed: Correct polarity ☑ Phase sequence ☐

SPD: Operational status confirmed¶ ☐ N/A ☑

Details of test instruments used (serial and/or asset numbers)

Multifunction: 8884

Continuity:

Insulation resistance:

Earth fault loop impedance:

RCD:

Earth electrode resistance:

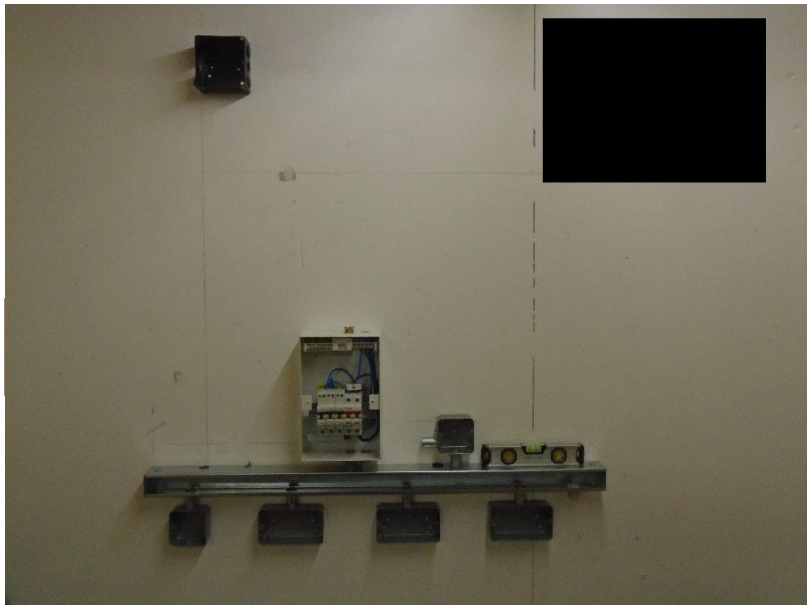
TEST RESULT DETAILS

17 Circuit number	Continuity (Ω)					Insulation resistance			26 Polarity¶	Z_s (Ω)	RCD		AFDD	31 Remarks
	Ring final circuit			$(R_1 + R_2)$ or R_2										Include details of circuits and/or installed equipment vulnerable to damage when testing (continue on a separate sheet if necessary)
	18 r_1 (line) (Ω)	19 r_n (neutral)	20 r_2 (cpc)	21 $(R_1 + R_2)$	22 R_2	23 Test voltage (V)	24 Live - Live (MΩ)	25 Live - Earth (MΩ)		27 Maximum measured	28 Disconnection time (ms)"	29 Test button operation	30 Manual test button operation	
1	0.03	0.02	0.02	0.14	N/A	500	>999	✓	✓	0.56	19.1	✓	N/A	
2	N/A	N/A	N/A	0.03	N/A	500	>999	✓	✓	0.83	20.4	✓	N/A	Calculated not tested Zs
3	N/A	N/A	N/A	0.04	N/A	500	>999	✓	✓	0.84	20.4	✓	N/A	Calculated not tested Zs
4	—	—	—	—	—	[redacted]	—	—	—	—	—	—	—	
5	N/A	N/A	N/A	N/A	0.00	500	[redacted]	N/A	N/A	N/A	N/A	N/A	N/A	

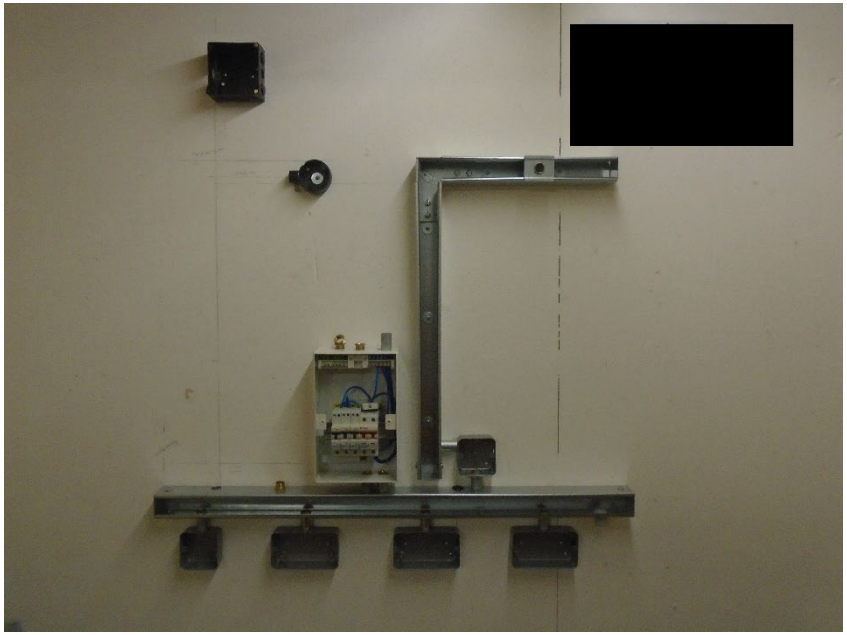
Tested by name (Capitals): [redacted]

Photographic evidence

2 hours



4 hours



10 hours

Practical Observation (PO) Form (Task 2)

8710-33 T Level Technical Qualification in Building Services Engineering for Construction

8710-353 Electrotechnical Engineering (Summer 2024)

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

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

Task 2 assessment themes:

- Health and safety
- Systems and components
  - Documentation
  - Technical information
- Reports and information
- Inspecting and testing of systems and components
- Handover and communication

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

Assessment theme	Assessor observation notes
Health and safety	The candidate wore the correct PPE throughout the assessment, including goggles whilst drilling. Tools were used safely, including electricians knife, hacksaw and junior hacksaw for cutting steelwork and gloves worn whilst stripping SWA. Conduit bending machine used correctly and safely. Correct conduit bending machine vice used for holding conduit whilst cutting to length. Stock and die cleaned of swarf after use and cutting compound used.

	Junior hacksaw used correctly for swa, knife used correctly to cut sheathing. Hacksaw used correctly and safely using the correct technique for lighting, trunking. Work area kept clean and tidy with cleaning at regular intervals. Hop up not packed away on 6 hour photo. Safe isolation conducted correctly and competently in the correct sequence.
Systems and components (Installation)	Logical sequencing applied to the install including measuring out, marking the location ready for first fixing, then second fixing the installation. Trunking cut to the correct length and sharp edges filed smooth. Position of coupler marked accurately and connected to CCU drilled in the correct position. Trunking cut to the correct size and marked appropriately for drilling. Marked datum line as reference to position conduit. And accessories. High quality. Conduit cut to the correct length. An accurate 90º bend was produced and checked for accuracy. Stock and die used correctly top thread the correct length. Saddle used for support. Drilled 10 mm out of position as measured to the centre of the 20mm conduit instead of the back SWA length measured incorrectly by 100mm too long and cut using a hacksaw and the correct technique. Earth tag used and drilled at the adaptable box. Cleats used to secure the cable with a nice smooth bend. Glanded correctly. Length rectified to prevent a swan neck. Lighting trunking constructed using the correct techniques and to industry standard. Levels taken regularly for alignment and aesthetics with 45º cut on trunking lid giving a secure fit. Bonding conductor Correct cross-sectional area you used. Terminated correctly using a ring crimp and compression gland. All circuits wired correctly with the correct size, conductors cross-sectional area. Correct lengths used and adequately terminated. High level of detail present.

Systems and components (Decommissioning)	Worked in a safe and logical manner to strip down components from bay wall. Used hand tools correctly and safely to disassemble trunking systems and conduit. Sorted waste materials into storage for reuse, recycling bins, and landfill bins. Dust sheet prepared prior to decommissioning to protect the floor. Holes in walls filled with filler and sanded to prepare for painting. Cleared floor area with brush and vacuum to clear away filler dust. Walls painted with two even coats of paint to restore to original condition. A high level of understanding show during the professional discussion regarding the decommissioning processes and procedures consideration the environment, environmental impact and relevant legislation.
Reports and information	The electrical installation certificate was completed mainly accurately with minimal incorrect details. Next inspection date incorrect. IPF values do not match on EIC and schedule of test results. Number of schedules incomplete.
Inspecting and testing of systems and components	Safely isolated the supply prior to inspection and testing. Tested continuity on radial circuits correctly and without hesitation. IRT conducted accurately on the lighting circuits as loads and RCBO disconnected. Effectively verified continuity of bonding to pipework using long lead method. Excellent knowledge demonstrated when testing ring final circuit following 3 step process as outlined in On-Site Guide. Confirmed polarity of all circuits using approved methods. Referred to On-Site Guide when performing testing to check measured values against stated limits. Confidently performed live testing following procedures as described in the On-Site Guide.

	Demonstrated a high level of knowledge and understanding on the maximum Zs value required and compared to the on site guide. Successfully completed functional checks on all circuits. A high level of understanding was evident.
Handover and communication	Explained safe isolation procedure and testing using correct terminology. Communicated clearly and concisely in a professional manner. Appropriate language used whilst handing over to the client and made to feel at ease with their demeanour and mannerisms.

Any other aspects

Internal assessor signature	**Date**
X	DD/MM/YY
If completing electronically, double click next to the 'X' to add an electronic signature once the record is **finalised**.	

Task 3 – Carrying out maintenance

Assessment number (eg 1234-033)	8710-353
Assessment title	Electrotechnical Engineering Occupational specialism

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

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

Task(s)	3
Evidence title / description	• Six completed report cards
Date submitted by candidate	DD/MM/YY

Task

Assessment themes:

- Health and safety
- Systems and components
    - Documentation
    - Technical information
- Reports and information
- Handover and communication
- Working with faults

Candidates must carry out the following for a **minimum** of **six** faults. All work must be undertaken with the installation fully isolated.

For each fault, candidates must:

- Select a job card from the range offered by the tutor/assessor
- Copy the job card reference number onto the blank report sheet in **Figure 8**
- Identify, from the range of equipment given, necessary items that will be required in order to prepare and diagnose the fault description provided
- Carry out checks to test equipment prior to using it
- Locate the fault, using a logical process
- Complete the report sheet to evidence the following:
- Description of work done to find fault.
- Tests carried out to locate the fault, including readings (if any)
- The nature of the fault
- Brief description of actions required, including materials and time required to rectify the fault
- Further actions required to ensure rectification is suitable.
- Communicate orally the requirements to rectify the fault

All work **must** be to current standards and carried out in accordance with **all** health and safety requirements. Any unsafe actions will result in termination of assessment.

What the candidate must produce for marking:

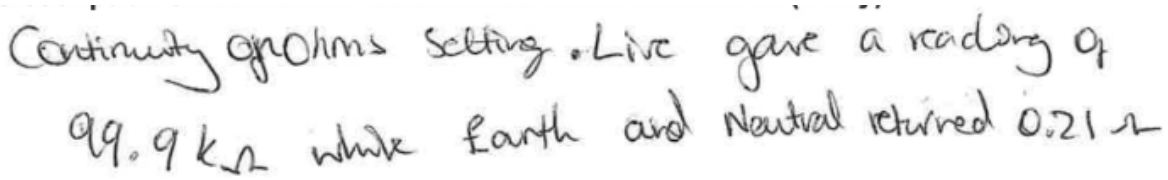
- Six completed report cards.

Additional evidence of candidate performance that must be captured for marking:

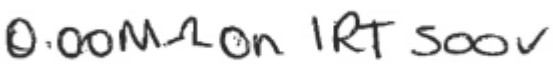
- Tutor/assessor feedback on performance of diagnostic techniques
- Tutor/assessor observations.

Candidate evidence

Figure 8 - Fault Report Sheet

Task 3 Fault Report Sheet	
Job card reference number: 19	
Candidate name: <first name> <surname>	**Date of assessment:** DD/MM/YY
Description of work done/ tests carried out to locate fault (if any)  Continuity on Ohms setting. Live gave a reading of 99.9 kΩ while Earth and Neutral returned 0.21Ω **The nature of the fault** Open circuit on live conductor **Brief description including materials required to fix the fault** Did continuity test on live and neutral conductors. Reading of 99.9 kΩ, same reading on live and earth, normal reading between earth and neutral of 0.21Ω. Reterminate or replace live conductor and recycle old one if replacement is needed. **Actions required to ensure rectification is suitable** Terminate live conductor correctly if termination is 100k or replace cable if faulty. Then perform a functioned test to ensure all is working correctly.	

Task 3 Fault Report Sheet	
Job card reference number: 9	
Candidate name: <first name> <surname>	**Date of assessment:** DD/MM/YY
Description of work done/ tests carried out to locate fault (if any) Performed all IRT tests all came back at >999, then tested continuity between earth and neautral came back as 0.93, continuity between live and earth and live and neutral both came back as 99.9 k Ω **The nature of the fault** Open circuit on live conductor. **Brief description including materials required to fix the fault** Requires a replacement of live conductor. **Actions required to ensure rectification is suitable** Perform tests again once new live conductor has been installed into circuit, then perform functioned tests.	

Task 3 Fault Report Sheet	
Job card reference number: 4	
Candidate name: <first name> <surname>	**Date of assessment:** DD/MM/YY
Description of work done/ tests carried out to locate fault (if any) Insulation resistance test on 500v, tested at consumer unit. **The nature of the fault** Short circuit between live and neutral, tester read  **Brief description including materials required to fix the fault** Replace neutral and live conductors in circuit as they may be damaged, ensure new conductors are not touching **Actions required to ensure rectification is suitable** Perform tests such as continuity and IRT on circuit once faults have been resolved. Perform functional tests on	

Task 3 Fault Report Sheet	
Job card reference number: 15	
Candidate name: <first name> <surname>	**Date of assessment:** DD/MM/YY

Description of work done/ tests carried out to locate fault (if any)

All came back normal 999

Insulation resistance test -

Then tested continuity between all conductors, neutral was 99.9 k Ω

The nature of the fault

Open circuit on neutral k Ω, live was 0.36 Ω and earth 0.47 Ω and neutral was 99.9 k Ω showing an open circuit.

Brief description including materials required to fix the fault

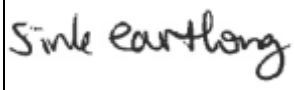
Neutral conductor may have to be reterminated or potentially replaced with 2.5 mm^2 neutral if faulty.

Actions required to ensure rectification is suitable

Dead test all circuits once neutral has been replaced, test continuity and insulation resistance complies. Then run functional tests to check circuit is still functioning.

Task 3 Fault Report Sheet	
Job card reference number: 6	
Candidate name: <first name> <surname>	**Date of assessment:** DD/MM/YY

Description of work done/ tests carried out to locate fault (if any)

Set tester to  , removed bonding conductors and tested between them and 

a result of 99.9 kΩ showed up meaning the earth is broken somewhere in the circuit.

The nature of the fault

Earth fault

Brief description including materials required to fix the fault

New 10 mm^2 Cpc cable would have to be installed instead of the old one. Recycle the old Cpc

Actions required to ensure rectification is suitable

One new cpc has been placed, test continuity from consumer unit to boning, valve should read less than 0.05 Ω

Task 3 Fault Report Sheet	
Job card reference number: 14	
Candidate name: <first name> <surname>	**Date of assessment:** DD/MM/YY

Description of work done/ tests carried out to locate fault (if any)

The nature of the fault

Earth fault

Brief description including materials required to fix the fault

New Cpc cable required, old ones to be replaced and recycled as they have breaks

Actions required to ensure rectification is suitable

~~Read~~ test Continuity after new Cpc has been installed to ensure circuit is safe. Complete functional tests to ensure circuit operates correctly again

Practical Observation (PO) Form (Task 3)

8710-33 T Level Technical Qualification in Building Services Engineering for Construction

8710-353 Electrotechnical Engineering (Summer 2024)

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

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

Task 3 assessment themes:

- Health and safety
- Systems and components
  - Documentation
  - Technical information
- Reports and information
- Handover and communication
- Working with faults

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

Assessment theme	Assessor observation notes
Health and safety	Good knowledge of hazards shown when inspecting the installation for faults. Candidate ensured system was isolated, insulated hand tools were used and rubber mat on floor to prevent electric shock hazard. Safe system of work followed to prevent injury.

Systems and components **(related to working with faults)**	Candidate understood documentation and tested in the correct locations for each fault card. Switches and sockets reconnected securely following testing.
Working with faults	Test equipment checked prior to use. Correct settings selected for continuity and polarity and test meter leads null. Some faults identified correctly using good reasoning and approved test methods. Correct voltage used when testing Insulation Resistance. Candidate shows some misunderstanding about fault types – when identifying an open circuit on the bonding conductor they have incorrectly stated that this is an 'Earth Fault'.
Reports and information	Documentation has some detail and shows good use of terminology in many instances. Unit symbols recorded to identify values correctly. Good description of materials required to fix the fault including the appropriate CSA for the cable.
Handover and communication	Candidate explained verbally the test method used and suspected fault type found in most instances using correct terminology.

Any other aspects

Internal assessor signature	**Date**
X	

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

Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

T: 0300 303 53 52

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

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

Web chat available **here**.