T-LEVELS | Institute for Apprenticeships & Technical Education

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

8710-353 Electrotechnical Engineering Occupational Specialism Candidate Pack (Brief)

Summer 2023

Version 1.1

City & Guilds | eal

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1. Assessment

This assessment is for the Electrotechnical Engineering Occupational Specialism component of the Technical Qualification. This pack consists of a practical assignment that includes a project brief including drawing(s) and diagram(s) as necessary, along with several tasks for you to complete.

2. Candidate Guidance

General guidance

This is a formal assessment that you will be marked and graded on. You will be marked on the quality and accuracy of the work you produce. It is therefore important that you carry your work out to the highest standard you can.

Plagiarism

Plagiarism is the failure to acknowledge sources properly and/or the submission of another person's work as if it were your own. Plagiarism is not allowed in this assignment.

This assignment is an assessment of your abilities, so the work submitted must be all your own and carried out under the conditions stated. You will be asked to sign a declaration that you have not had any help with the assignment. Your tutor/assessor is allowed to give you some help understanding the instructions if necessary, but they will record any other guidance you need, and this will be taken into account during marking.

Where research is allowed, your tutor/assessor must be able to identify which work you have done yourself, and what you have found from other sources. It is therefore important to make sure you acknowledge sources used and clearly reference any information taken from them (e.g. providing as a minimum a list of web addresses / books / articles etc used).

Timings and planning

You are advised to study the details of the assessment before starting.

You should check with your tutor/assessor that you have all the relevant materials, equipment and information/data sources that you need before starting the assessment.

You should take care when planning to make sure you have divided the time available between parts of the assignment tasks appropriately. Timings for tasks are provided within this pack to support with planning and time allocation.

If you have a good reason for needing more time, you will need to explain the reasons to your tutor/assessor and agree a new deadline date. Changes to dates will be at the discretion of the tutor/assessor, and they may not mark work that is handed in after the agreed deadlines.

Any requested changes to deadlines must be agreed by both your tutor/assessor and City & Guilds.

Word counts

Typical word counts are to be used as approximates for guidance to support the production of sufficient evidence. The marking will relate to the quality of the evidence produced and not whether the word count have been met.

Health and Safety

You must always work safely, in particular while you are carrying out practical tasks.

You must always follow any relevant Health and Safety regulations, Risk Assessments and codes of practice in line with centre requirements.

If your tutor/assessor sees you working in a way that is unsafe for yourself or others, they will highlight the issue and ask you to stop the task immediately. Your tutor/assessor will not be able to reassess you until they are sure you are ready for assessment and can work safely.

Presentation of work

Presentation of work must be neat, legible and appropriate to the task, and evidence required for submission.

You should make sure that each piece of evidence including any forms are clearly labelled with your name and the assignment reference.

All electronic files must be given a clear file name that allows your tutor/assessor to identify it as your work.

Written work may be word-processed or handwritten unless stated otherwise.

All sketches and drawings should be neat, tidy and annotated.

Calculations should be set out clearly, with all working shown, as well as any assumptions made. You should use appropriate units at all times, consistent with the requirements of the assignment.

Instructions for this assignment

Ensure you read all the provided assessment information issued by the tutor/assessor.

You must work independently and not share your work with any other candidates in these supervised assessment sessions.

Your work will be kept secure during any supervised breaks that are taken.

Internet access is **not** allowed, unless otherwise stated in the task.

You must complete all the tasks and present all evidence that is detailed in each task.

This assessment booklet contains the assignment brief.

The tasks have been separated into individual documents which will be handed to you at the start of each task.

Within each task you will find the following:

- **Conditions of assessment:** This will tell you the duration and rules you must follow when completing a task.
- **What must be produced for marking:** This describes the evidence you must submit when the task is completed. Be aware failure to submit any evidence requested can adversely affect your overall mark for the assessment.

- **Additional evidence of your performance that must be captured for marking:** This describes other forms of evidence that will be collected by the tutor/assessor to support the marking of your performance. This will often include but not limited to photographic and video evidence

Assessment themes

You will be assessed against a number of assessment themes. This assignment has a total of 90 marks. The table below shows the weighting of the marks for each of the performance outcomes.

Performance outcome	Typical knowledge and skills	Weighting
Install electrotechnical systems	Displays a breadth of knowledge and practical skills that enables them to complete the given installation tasks successfully. Has the technical skills to use tools and materials safely and in logical order in relation to a plan.	36%
Commission electrotechnical systems	Working in a safe manner, use of tools and test equipment and in accordance with BS 7671 Guidance Note 3. Carry out inspection, testing and commissioning of a given installation in the correct sequence. Complete the required documentation that is required for a new installation.	30%
Maintain electrotechnical systems	Applying knowledge and understanding through practical skills to solve a particular scenario/ problem in a logical sequence – justifying decisions, methods used and completion of maintenance records.	20%
Decommission electrotechnical systems	Logical and systematic approach to the task, clear consideration to environmental sustainability and recycling of materials, clear and practiced use of the techniques of making building fabric repairs to restore work area to pre-installation condition including correct selection of materials and finish products.	14%

3. Assignment Brief

You have been asked by your employer to be involved with the design, planning and installation of sections of the electrical installation for a client's building.

The installation layout is shown in the drawings in **Figures 1** and **2**. On completion, the installation will need to be inspected and verified. The DB for the shop and flat is to be supplied by a PVC SWA distribution circuit originating in the meter room for the whole building. The client has also reported some of the existing systems are faulty and in need of investigation and repair.

Figure 3 shows an incomplete design grid which is required for **Task 1.**

Figure 4 shows an incomplete form to determine the maximum demand, including diversity, which is required for **Task 1.**

Figure 5 shows a design schedule to determine earth fault loop impedances within **Task 1.**

Figure 6 shows a blank materials schedule required for **Task 1.**

Figure 7 shows a blank risk assessment form for **Task 1.**

Figure 8 shows an outline of the installation required for **Task 2.**

Figure 9 shows a fault report sheet for **Task 3.**

Figure 1 – Proposed shop layout

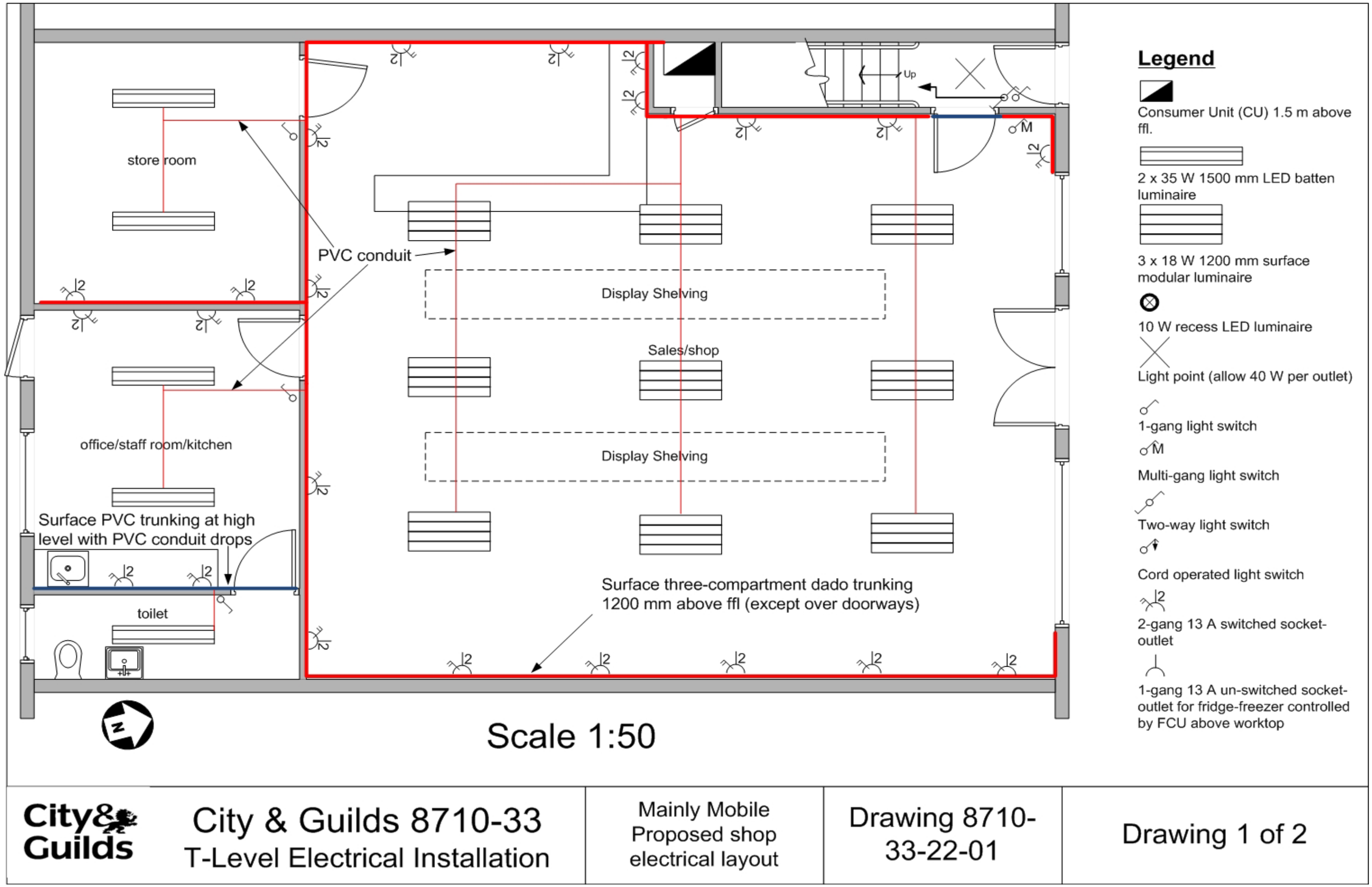
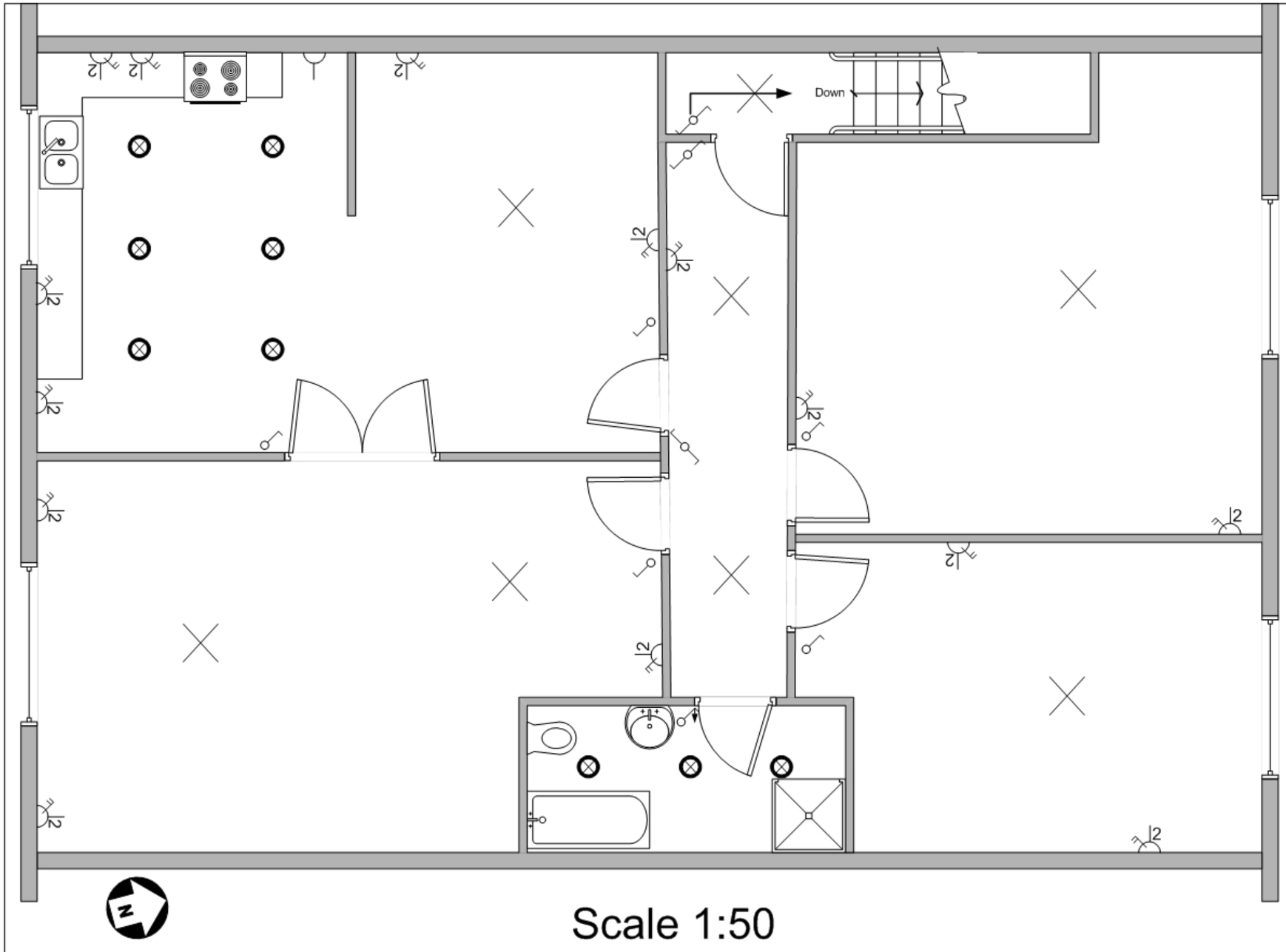


Figure 2 – Accommodation layout



Notes

1. Three-compartment DADO trunking in shop area to be mounted 1200 mm above finished floor level (ffl) except where it passes over doorways.

2. First floor lighting circuits in roof space to be installed under 200 mm of thermal insulation. Switch drops installed in stud/partitions touching inner wall surface.

3. Ground floor lighting and power circuits to be installed in DADO trunking and PVC conduit. Conduit for all lighting is installed in a 100 mm suspended ceiling void. Luminaires to be mounted on suspended ceiling system. Suspended ceiling is to be 2300 mm above ffl.

4. First floor cooker and socket-outlets to be run in floor void and plaster/stud partitions containing thermal insulation as method 102 reference Table 4D5 of BS 7671.

5. All internal walls in first floor accommodation are insulated wood joist stud plasterboard partitions. External and party walls are outer brick with insulated void and inner plasterboard walls

City & Guilds	City & Guilds 8710-33 T-Level Electrical Installation	Mainly Mobile Proposed accommodation electrical layout	Drawing 8710-33-22-02	Drawing 2 of 2

Figure 3 – Design grid

Consumer unit located in cupboard in shop VOLTAGE DROP TO COMPLY WITH BS 7671		Nominal voltage (U/U_0) 230 V		Earthing arrangement TN-C-S		External earth fault loop impedance (Z_e) 0.35 Ω		
Circuit	1	2	3	4	5	6	7	8
Description	Ring-final first floor sockets	Radial-final ground floor store/kitchen sockets	Radial-final ground floor shop sockets west side	Radial-final ground floor shop sockets east side	Electric cooker 11.5 kW	Lighting ground floor sales area	Lighting ground floor store, kitchen/toilet	Lighting first floor accommodation and staircase
Number of outlets	15	6	9	7	1	9	5	
Type of wiring	70 °C thermoplastic multi-core flat profile	70 °C thermoplastic single-core non-sheathed	70 °C thermoplastic single-core non-sheathed	70 °C thermoplastic single-core non-sheathed	70 °C thermoplastic multi-core flat profile	70 °C thermoplastic multi-core flat profile	70 °C thermoplastic multi-core flat profile	70 °C thermoplastic multi-core flat profile
Design current (I_b)	32 A	15 A	20 A	20 A			1.6 A	3.1 A
Type and nominal rating (I_n)	32 A B	20 A B	20 A C	20 A C			6 A C	6 A B
Length (metres)	68 m loop	26 m					18 m	
Installation method	102	B	B	B	102	B	B	101
Ambient temperature °C	25 °C	25 °C	25 °C	25 °C	30 °C	30 °C	30 °C	30 °C
Rating factor Ambient air temp. C_a					1	1	1	1
Total circuits in group	1	2	2	2	1	1	1	1
Rating factor grouping C_g	1				1	1	1	1
Minimum current capacity ($<I_t$)								
mV/A/m								
Actual voltage drop								
Minimum conductor csa mm^2								

Figure 4 – Maximum demand and diversity

Circuit design current (A)	Diversity applied (% or factor)	Demand following diversity (A)	Reason for diversity application
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Maximum demand (A)		Maximum demand after diversity (A)	
Maximum demand (kVA)		Maximum demand after diversity (kVA)	

Figure 5 – 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 first floor socket-outlets	32 A B Type BS EN 61009	68 m loop				
4. Radial-final ground shop sockets east side	20 A C Type BS EN 61009					

Figure 6 - Materials take off sheet (relating to Figures 1, 2 and 3)

This sheet may be reproduced as many times as necessary

Symbol	Description	Quantity

Figure 7 – Risk Assessment

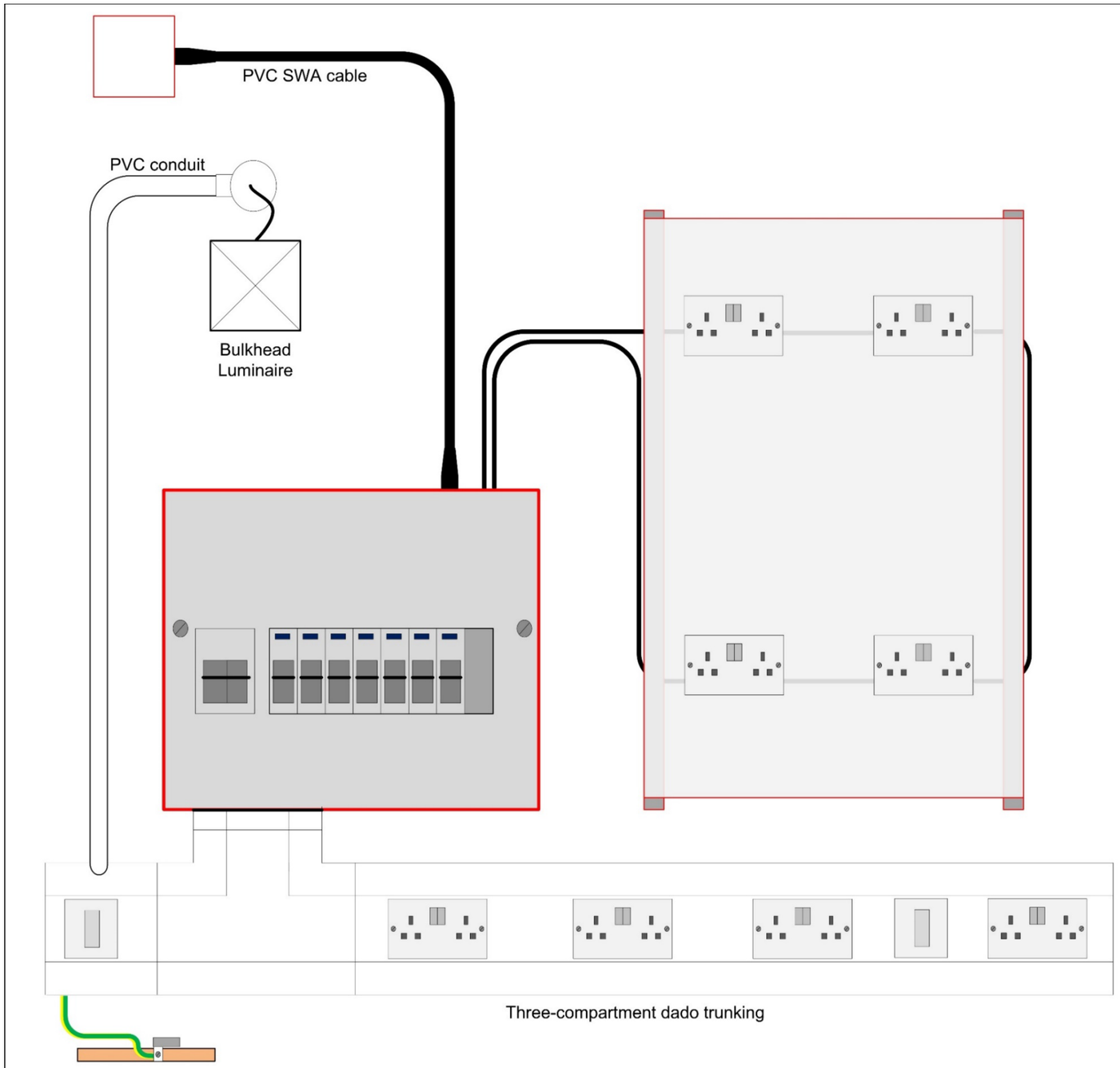
This risk assessment form may be modified by adding items only

Activity: **Location:**	**Date:** **Position:**

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

Figure 8 - Installation outline for Task 2



Notes

1. Items bordered in red must be fixed prior to the assessment and shall not be removed at any point during the assessment.

2. Plasterboard for housing ring-final circuit socket-outlets to be mounted on minimum 25 mm wood battens. Candidates to mark and cut plasterboard to accommodate plasterboard boxes as part of the assessment. Candidates to drill wood stud for cables as part of the assessment. Plasterboard must be a minimum area to accommodate four boxes whilst maintaining suitable structural integrity of the boarding.

3. Cable clips and saddles not shown for clarity but suitable fixings must be used as part of the assessment.

4. The drawing is not to scale and representative of layout. Layout may be altered to suit location and dimensions but all cables and the conduit must contain the minimum of bends as indicated.

5. Circuits shall be arranged as follows:

Circuit 1. Ring final socket-outlet circuit supplying four-number two-gang switched socket-outlets flush mounted in plasterboard. Wiring to be flat profile cable clipped where appropriate.

Circuit 2. Radial socket-outlet circuit supplying four-number two-gang switched socket-outlets mounted in dado trunking. Wiring to be single-core, non-sheathed cable.

Circuit 3. Lighting circuit with two-way switching mounted in dado trunking controlling a bulkhead luminaire via PVC conduit. Wiring to be single-core, non-sheathed cable.

6. SWA cable to act as distribution circuit supplying Consumer Unit. The SWA must contain at least one 90 degree bend.

7. Main protective bonding to connect to simulated installation gas pipe.

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Drawing 8710-33-22-03

City & Guilds 8710-33 T-Level Electrical Installation

Not to Scale

Practical installation layout

Figure 9 - Fault Report Sheet

Task 3 Fault Report Sheet	
Job card reference number:	
Candidate name:	**Date of assessment:**
Description of work done/ tests carried out to locate fault (if any) **The nature of the fault** **Brief description including materials required to fix the fault** **Actions required to ensure rectification is suitable**	

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**

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Web chat available **here**.

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