T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Building Services Engineering for Construction

Electrical and Electronic Equipment Engineering

Guide standard exemplification material

Distinction – Sample 2021

City & Guilds | eal

Contents

Introduction

The sample assessment materials within this document refers to the electrical and electronic equipment engineering sample occupational specialism assignment. The aim of these materials is to provide centres with examples of knowledge, skills and understanding that attest to 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 GEM are separated into three sections as described below. Materials are presented against a number of tasks from the assignment.

Task - This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photograph/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 GEM has been identified within this section.

In this GEM there is candidate evidence from:

Task 1

Task 2

Task 3

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

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

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.

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:

- Produce a materials and product list giving reasons for their choices. Product relates to the specialist technologies required for this installation
- Produce a circuit design schedule for the new socket-outlet circuit. Candidates should assume the actual length of circuit to be 27 m, clipped directly to a masonry surface in an ambient temperature of 25 ℃
- Produce a risk assessment in relation to the removal of RCD protection as Regulation 411.3.3 in BS 7671

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

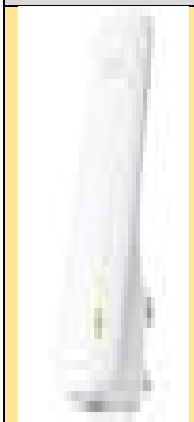
- Materials and product list with notes next to each item giving detailed reasons why this equipment is suitable
- Circuit design schedule showing all calculations
- Risk assessment in accordance with regulation 411.3.3 of BS 7671. To include assessment of Client's equipment, users, user training, use restrictions**.**

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

- Assessor observation of the quality, consistency and accuracy of the research work, including details of any assistance provided.

Candidate evidence

Task 1 - Product list

Product	Supplier	Product features	Product information	Specification	Price	Quantity required	Total Price
 TP-LINK RE200 WiFi Range Extender - AC 750, Dual-band	Currys PC world	• Boost your Wi-Fi signal further • AC 750 • Dual band (2.4 GHz + 5 GHz) • One Ethernet port • Plugs into a spare plug socket	**Top features:** - Next-generation WiFi gives you higher speeds - Dual-band WiFi with Ethernet connectivity - Practical range extending with indicator lights **Next-generation WiFi** Use the dual-band TP-Link **RE200 WiFi Range Extender** to expand the WiFi coverage in your home, giving you faster access for all WiFi devices. Using AC WiFi technology, this compact but powerful TP-Link range extender lets you establish broader wireless internet coverage around your house. You'll be able to use the TP-Link **RE200** with any standard WiFi router and establish stronger dual-band connections in “dead” areas that were previously difficult to access. Get seamless wireless coverage throughout your home or office that allows you to get more done whether you're at work or play. **Dual-band WiFi**	**OVERVIEW** Type- Wall plug range extender Rating- AC 750 Data transfer speed - Up to 750 Mbps Wireless band - Dual-band (2.4 GHz + 5 GHz) CONNECTIVITY - Power socket pass through No Wired connections Ethernet port x 1 Antenna 2 GENERAL Colour White Box contents- TP-Link RE200 WiFi Range Extender RJ-45 Ethernet cable Quick installation guide Dimensions- 110 x 65.8 x 75.2 mm (H x W x D) Weight 100 g Manufacturer’s guarantee 3 years	£22.99.	1	£22.99

Product	Supplier	Product features	Product information	Specification	Price	Quantity required	Total Price
			The TP-Link **RE200 WiFi Range Extender** offers up to 750 Mbps dual-band WiFi with 300 Mbps speeds on the 2.4 GHz wireless band, and 433 Mbps over the 5 GHz band. Since it comes with an Ethernet port, you can also connect devices that need a wired link such as a Smart TV or PC. **Practical range extending** Using the Smart Signal Indicator light, you'll easily be able to find the best place to put the **RE200**. It also offers a profile function that remembers previously connected wireless networks, saving you time.				
	TLC	Suitable for Combi Boilers LED Display Suitable for Gas, LPG, Oil & Some Electric Boilers 6 Daily Schedule Time Slots	6-Hour Heating Boost Function Automatic Frost Protection Child Lock	Hive Hub Required for Smart Control Smart Hub and Internet Connection Required	£99	1	£99

Product	Supplier	Product features	Product information	Specification	Price	Quantity required	Total Price
	TLC		Control and schedule power in the home or outside via touch, voice commands or app. No need for a hub, cloud costs or subscription.	Quick and easy set-up, with in-App support. Set timer schedules, countdown function or random security options. Compatible with Google Home and Amazon Alexa for smart home integration	£15	2	£15
	TLC	Smart retractive dimming kit containing front plate (CMA401), dimming receiver (RFDEL71B) and retractive switch module	Click Smart multifunction dimming receiver with switch input (RFDEL-71B), overcomes the issue of LED flicker which may occur with existing dimmers	Will dim up to 160W of dimmable LED, halogen and CFL Compatible with the majority of dimmable LED sources available Select between capacitive, LED, resistive and inductive loads Kit can be retrofitted to existing circuit	£80	1	£80
	TLC	**Quinetic 6 Amp Wireless Switch Receiver**	The Quinetic wireless controller with a high efficiency switching power supply has a wide voltage range with excellent stability and durability.	A load capacity of 6A relay. The Quinetic wireless controller is equipped with an in-rush current suppression function, creating a safe and durable product	£40	2	£40

Product	Supplier	Product features	Product information	Specification	Price	Quantity required	Total Price
	TLC	Wireless Quinetic energy switch and wireless receiving controller can be paired with any combination a controller can be controlled by a maximum of 10 separate switches, a switch can pair an unlimited number of controllers.	The Quinetic wireless switch has a built-in micro energy generator. The action of pressing the switch, generates enough kinetic energy to create and transmit a radio signal and switch on/off via a receiver (wireless controller) the lamp or other loads	Weatherproof IP67 On / Off Switch Dimmable when used with Dimmable Switch Receivers .	£25	2	£25
These products have been selected based on the assignment brief, as per the task. The listed products have been chosen based on their compatibility and capability. When selecting the products, there were many things to consider, such as size, ratings and product features. Also, consideration of product features has been the main focus, as well as considering the cost of products.							

Commentary

The candidate demonstrates thorough knowledge and understanding by producing a product list that identifies all resource products and components with accurate detail to carry out the tasks and meet the assignment brief requirements. Detailed consideration has been given to aesthetics of the finished product and the compatibility of accessories/products with other components within the task as per the specification.

The candidate has considered manufacturers literature relating to the products that will encompass relevant product requirements, which should be in line with associated legislation. Candidate has given strong and detailed justification for their choices.

Fully considers client perspective in relation to clarity of information in level of detail, terminology and it covers all equipment within the installation in full.

Health and safety has been fully considered during this task

Candidate evidence

Task 1 - Materials list

Equipment/Materials	Quantity
Adaptable boxes containing three terminals marked L-N-E and an indicator lamp which illuminates when energised	2
Two-port central heating valve	1
Heating control wiring centre	1
Smart programmable room thermostat with control unit	1
3-compartment dado trunking	2 meters
T joint for trunking	1
Cat 5e or Cat 6 data outlets	2
RJ45 connectors	Box
Mini Trunking YT2	2 meters
YT2 flat bend	2
3-core PVC SWA cable	2 metres
20s gland pak	2
Metal-clad surface 2-gang 13 A switched socket-outlet	1
Surface mounted occupancy switch	2
on/off wireless switches	2
dimmer wireless switch	1
wireless switch receivers; one capable of multi-switch one capable of dimming	2
smart controlled 2-gang 13 A socket-outlets	2
Wi-Fi extender	1
Broadband router	1
16amp isolator BSEN 60309 (Metal clad)	1
Range of flexible cable suitable for connecting heating equipment and cables for connecting switch receivers	50m drum
Consumables (Fixings etc)	
Screws/plugs	Boxes
Cable ties (pack)	1
Tools and Plant	
Marking tool/Pencil	1
Tape measure	1
Power Drill (Battery/Mains)	1
Selection of drilling bits (Steel/Masonry) 6mm etc	1
20mm Hole cutter/saw	1
Hacksaw	1
Pipe Grips/footprints	2

Equipment/Materials	Quantity
Adjustable spanner	2
Selection of metal files (reamer)	2/3
Electricians Knife	1
Side cutters	1
Pliers	1
VDE Screwdriver Philips/Pozi small	1
VDE Screwdriver Philips/Pozi medium	1
VDE Screwdriver Philips/Pozi large	1
VDE Screwdriver flat head small	1
VDE Screwdriver flat head medium	1
VDE Screwdriver flat head large	1
Cable/wire strippers	1
Hammer	1
Centre punch	1
Scriber	1
Spirt levels	2
Set square	1
Testing instrument (Multi-functional)	1
AVI (approved voltage indicator)	1
Clean cloths	2
PPE	
Overalls/protective clothing	
Steel toe capped boots	
Goggles/glasses	

Commentary

The candidate demonstrates thorough knowledge and understanding by producing a materials list that identifies all the resources and components with accurate quantities to carry out the tasks and meet the assignment brief requirements. Excellent detail displayed, in relation to materials and tools required to successfully complete the installation task.

Information in the list is clear and logically presented with all elements considered and in line with industry requitements. Terminology used is accurate and the quantities provided are comprehensive.

Health and safety has been fully considered during this task.

Candidate evidence

Task 1 - Circuit design schedule

Circuit	**06**
Description	One metal-clad 2-gang 13 A switched socket-outlet
No. outlets	One (1)
Type of wiring	SWA cable (Thermosetting 90 ℃) or (Thermoplastic 70℃)
Design current (Ib)	16 A Assumption
Type and Nominal Rating (In)	16 A Type B
Length	27m
Installation method	Clipped Direct reference method C
Ambient Temperature	25 ℃
Rating factor Ambient air temp	1.02 **(On-site guide p152 table F1)**
Total circuits in group	1
Rating factor for grouping	1 **(On-site guide p154 table F3)**
Minimum current capacity	16 A Applying factors not detrimental
mV/A/m	Based on 2.5mm CSA (3-core) 15mV/A/m
Actual volt drop	6.48Volts acceptable as below 5% of 230V (11.5V)
Minimum conductor size	2.5mm required as 1.5mm SWA exceeds the 5% of 230V (11.5V)
Formula, calculations and literature referencing (Page numbers and tables used) shown and stated	Iz>In/CF Vd=mV/A/m x Ib x L/1000

Commentary

The candidate shows excellent knowledge and understanding creating a circuit design schedule with accuracy and detail. The schedule identifies all relevant design information required to successfully complete the electrical design for this circuit.

Excellent recording and usage of electrical literature found, with page numbers and tables clearly and accurately referenced. All design criteria have been accurately completed, with all necessary calculations made and shown, in line with BS7671 and the assignment brief requirements.

Clear justifications and reasoning are provided throughout such as the minimum conductor size. Documentation detailed and included all key design information. Full consideration of technical language, and terminology, has been used throughout.

Calculations are accurate with all factors considered and working out shown in detail. All units are nominated, and calculations are presented to a uniformed number of decimal places.

Candidate evidence

Task 1 - Risk assessment

Activity: Risk assessment in accordance with regulation 411.3.3 of BS 7671 – Removal of RCD Protection **Location: Workspace**	**Date: 12 2 2021** **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	Are the Risks Controlled?
1	Removal of RCD Protection	Usage of Client's equipment	Staff/user	Relevant product training needed, as well as strict instruction of the following of product usage and guidelines	2/3	1	3	Y
	Removal of RCD Protection	Socket misuse leading to electric shock	Staff/user	Suitable training and instruction given, in relation to what equipment only, must be sourced through/by this socket outlet. The socket-outlet and circuit must be clearly labelled and identified for correct/designated use. (Patch panel equipment only)	2/3	1	3	Y
	Removal of RCD Protection	Staff/user	Staff/user	Appropriate training and component instruction given to users. Explain the restrictions associated with the socket-outlet	2/3	1	3	Y

Commentary

The candidate demonstrates a thorough knowledge and understanding of the different types of risk and hazards associated with the tasks, having identified 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.

Probability of each of the hazards/risks occurring has been considered for all risks in accordance with BS7671.

Risk mitigation methods are detailed and have been clearly identified for all potential risks

Task 2 – Installation and Commission

(Assessment themes: Health and safety, systems and components, inspection and testing, handover and communication)

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

- Certification and schedules
- Basic O&M Manual to include all manufacturer's information and basic instructions that the client would find useful not included in manufacturer's data
- Statement relating to the safe, sustainable and legal disposal of equipment
- Assessor observations
  - Decommissioning and safe isolation
  - Installation as per client schedule
  - Inspection, testing and commissioning
  - Handover to the client

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

- Certification and schedules
- Statement relating to the safe, sustainable and legal disposal of equipment
- Assessor observations of the following
  - Decommissioning and safe isolation
  - Installation as per client schedule

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

- Basic O&M Manual to include all manufacturer's information and basic instructions that the client would find useful not included in manufacturer's data
- Assessor observations
  - Inspection, testing and commissioning
  - Handover to the client

Photographic evidence required:

- Evidence of the installation at one-hour stages showing progression. (photographs should only show the installation wall/board and not the candidate) **(photograph 1 – 4)**
- Completed installation and equipment **(photograph 5)**
- Photograph showing the inside of the distribution board and SWA termination **(photograph 6)**

Candidate evidence

Task 2 - Certificates and schedules

INDICATIVE CONTENT.

ELECTRICAL INSTALLATION CERTIFICATE
(REQUIREMENTS FOR ELECTRICAL INSTALLATIONS - BS 7671 [IET WIRING REGULATIONS])

DETAILS OF THE CLIENT CITY & GUILDS TLEVEL LTD.

INSTALLATION ADDRESS LONDON

DESCRIPTION AND EXTENT OF THE INSTALLATION
Description of installation: (SMALL OFFICE) ONE NEW ELECTRICAL CIRCUIT.
Extent of installation covered by this Certificate:
CIRCUIT NO 6 (ONLY)
SWA - NEW CIRCUIT (SOCKET OUTLET)
SOURCING NEW PATCH PANEL.
(Use continuation sheet if necessary) see continuation sheet No: .....

New installation ☐
Addition to an existing installation ☑
Alteration to an existing installation ☐

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 and additionally where this certificate applies to an addition or alteration, the safety of the existing installation is not impaired, 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 N/A (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): NONE.

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: P C JENKIN Date: 16/02/21 Name (IN BLOCK LETTERS): CLIVE JENKIN Designer No 1

Signature: — Date: — Name (IN BLOCK LETTERS): — 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 N/A (date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120.3 and 133.5): NONE

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

For CONSTRUCTION of the installation:

Signature: P C JENKIN Date: 16/02/21 Name (IN BLOCK LETTERS): CLIVE JENKIN Constructor

FOR INSPECTION & 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 N/A (date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120.3 and 133.5): NONE

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

For INSPECTION AND TESTING of the installation:

Signature: P C JENKIN Date: 16/02/21 Name (IN BLOCK LETTERS): CLIVE JENKIN Inspector

NEXT INSPECTION
I/We the designer(s), recommend that this installation is further inspected and tested after an interval of not more than 5 years/months.

PARTICULARS OF SIGNATORIES TO THE ELECTRICAL INSTALLATION CERTIFICATE

Designer (No 1)
Name: CLIVE JENKIN Company: MONITOR INSTALLATION LTD
Address: 1 GRANMOOR EASTERMOUTH Postcode: CA99 1GR Tel No: 01234 567890

Designer (No 2) (if applicable)
Name: N/A Company: N/A
Address: Postcode: Tel No:

Constructor
Name: SAME AS Company: —
Address: ABOVE Postcode: Tel No:

Inspector
Name: SAME AS Company: —
Address: ABOVE Postcode: Tel No:

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_0 / U[1] 230 V	BS (EN) 88
TN-S ☑	1-phase, 2-wire ☑	2-wire ☐	Nominal frequency, f[1] 50 Hz	Type 2
TN-C-S ☐	2-phase, 3-wire ☐	3-wire ☐	Prospective fault current, I_p[2] 1.6 kA	Rated current 100 A
TT ☐	3-phase, 3-wire ☐	Other ☐	External loop impedance, Z_e[2] 0.14 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) ☐ N/A

PARTICULARS OF INSTALLATION REFERRED TO IN THE CERTIFICATE

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

Maximum Demand
Maximum demand (load) 60/80 kVA / Amps Delete as appropriate

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

Main Protective Conductors

Earthing conductor	Material CU csa 16 mm²	Connection / continuity verified ☑
Main protective bonding conductors (to extraneous-conductive-parts)	Material CU 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 N/A

Main Switch / Switch-Fuse / Circuit-Breaker / RCD

Location STORE ROOM GROUND FLOOR
BS(EN) 60947-3
No of poles 2
Current rating 100 A
Fuse / device rating or setting N/A A
Voltage rating 230 V

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

COMMENTS ON EXISTING INSTALLATION (in the case of an addition or alteration see Regulation 644.1.2):
SOME ALTERATIONS BEING MADE.
UPDATE ACCESSORIES WITH SMART CONTROL.

SCHEDULES
The attached Schedules are part of this document and this Certificate is valid only when they are attached to it.
1 Schedules of Inspections and 1 Schedules of Test Results are attached.
(Enter quantities of schedules attached).

INDICATIVE CONTENT

SCHEDULE OF INSPECTIONS (for new installation work only) for

DOMESTIC AND SIMILAR PREMISES WITH UP TO 100 A SUPPLY

NOTE 1: This form is suitable for many types of smaller installation, not exclusively domestic.

All items inspected in order to confirm, as appropriate, compliance with the relevant clauses in BS 7671. The list of items and associated examples where given are not exhaustive.

NOTE 2: Insert ✓ to indicate an inspection has been carried out and the result is satisfactory, or N/A to indicate that the inspection is not applicable to a particular item.

Item No	DESCRIPTION	Outcome See Note 2
1.0	**EXTERNAL CONDITION OF INTAKE EQUIPMENT (VISUAL INSPECTION ONLY)**	
1.1	Service cable	✓
1.2	Service head	✓
1.3	Earthing arrangement	✓
1.4	Meter tails	✓
1.5	Metering equipment	✓
1.6	Isolator (where present)	N/A
2.0	**PARALLEL OR SWITCHED ALTERNATIVE SOURCES OF SUPPLY**	N/A
2.1	Adequate arrangements where a generating set operates as a switched alternative to the public supply (551.6)	N/A
2.2	Adequate arrangements where a generating set operates in parallel with the public supply (551.7)	N/A
3.0	**AUTOMATIC DISCONNECTION OF SUPPLY**	
3.1	**Presence and adequacy of earthing and protective bonding arrangements:**	
	• Distributor's earthing arrangement (542.1.2.1, 542.1.2.2)	✓
	• Installation earth electrode (where applicable) (542.1.2.3)	N/A
	• Earthing conductor and connections, including accessibility (542.3; 543.3.2)	✓
	• Main protective bonding conductors and connections, including accessibility (411.3.1.2; 543.3.2; 544.1)	✓
	• Provision of safety electrical earthing/bonding labels at all appropriate locations (514.13)	✓
	• RCD(s) provided for fault protection (411.4.204; 411.5.3)	N/A
4.0	**BASIC PROTECTION**	
4.1	**Presence and adequacy of measures to provide basic protection (prevention of contact with live parts) within the installation:**	
	• Insulation of live parts e.g. conductors completely covered with durable insulating material (416.1)	✓
	• Barriers or enclosures e.g. correct IP rating (416.2)	✓
5.0	**ADDITIONAL PROTECTION**	
5.1	**Presence and effectiveness of additional protection methods:**	
	• RCD(s) not exceeding 30 mA operating current (415.1; Part 7), see Item 8.14 of this schedule	✓ N/A
	• Supplementary bonding (415.2; Part 7)	N/A
6.0	**OTHER METHODS OF PROTECTION**	
6.1	**Presence and effectiveness of methods which give both basic and fault protection:**	
	• SELV system, including the source and associated circuits (Section 414)	N/A
	• PELV system, including the source and associated circuits (Section 414)	N/A
	• Double or reinforced insulation i.e. Class II or equivalent equipment and associated circuits (Section 412)	N/A
	• Electrical separation for one item of equipment e.g. shaver supply unit (Section 413)	N/A
7.0	**CONSUMER UNIT(S) / DISTRIBUTION BOARD(S):**	
7.1	Adequacy of access and working space for items of electrical equipment including switchgear (132.12)	✓
7.2	Components are suitable according to assembly manufacturer's instructions or literature (536.4.203)	✓
7.3	Presence of linked main switch(es) (462.1.201)	✓
7.4	Isolators, for every circuit or group of circuits and all items of equipment (462.2)	✓
7.5	Suitability of enclosure(s) for IP and fire ratings (416.2; 421.1.6; 421.1.201; 526.5)	✓

INDICATIVE CONTENT:

Item No	DESCRIPTION	Outcome See Note 2
	CONSUMER UNIT(S) / DISTRIBUTION BOARD(S) continued	
7.6	Protection against mechanical damage where cables enter equipment (522.8.1; 522.8.5; 522.8.11)	✓
7.7	Confirmation that ALL conductor connections are correctly located in terminals and are tight and secure (526.1)	✓
7.8	Avoidance of heating effects where cables enter ferromagnetic enclosures e.g. steel (521.5)	✓
7.9	Selection of correct type and ratings of circuit protective devices for overcurrent and fault protection (411.3.2; 411.4; 411.5; 411.6; Sections 432, 433; 537.3.1.1)	✓
7.10	**Presence of appropriate circuit charts, warning and other notices:**	
	• Provision of circuit charts/schedules or equivalent forms of information (514.9)	✓
	• Warning notice of method of isolation where live parts not capable of being isolated by a single device (514.11)	N/A
	• Periodic inspection and testing notice (514.12.1)	✓
	• RCD six-monthly test notice; where required (514.12.2)	✓
	• AFDD six-monthly test notice; where required	N/A
	• Warning notice of non-standard (mixed) colours of conductors present (514.14)	N/A
7.11	Presence of labels to indicate the purpose of switchgear and protective devices (514.1.1; 514.8)	✓

8.0	**CIRCUITS**	
8.1	Adequacy of conductors for current-carrying capacity with regard to type and nature of the installation (Section 523)	✓
8.2	Cable installation methods suitable for the location(s) and external influences (Section 522)	✓
8.3	Segregation/separation of Band I (ELV) and Band II (LV) circuits, and electrical and non-electrical services (528)	✓
8.4	Cables correctly erected and supported throughout, with protection against abrasion (Sections 521, 522)	✓
8.5	Provision of fire barriers, sealing arrangements where necessary (527.2)	✓
8.6	Non-sheathed cables enclosed throughout in conduit, ducting or trunking (521.10.1; 526.8)	✓ NA
8.7	Cables concealed under floors, above ceilings or in walls/partitions, adequately protected against damage (522.6.201, 522.6.202, 522.6.203; 522.6.204)	✓
8.8	Conductors correctly identified by colour, lettering or numbering (Section 514)	✓
8.9	Presence, adequacy and correct termination of protective conductors (411.3.1.1; 543.1)	✓
8.10	Cables and conductors correctly connected, enclosed and with no undue mechanical strain (Section 526)	✓
8.11	No basic insulation of a conductor visible outside enclosure (526.8)	✓
8.12	Single-pole devices for switching or protection in line conductors only (132.14.1; 530.3.3; 643.6)	✓
8.13	Accessories not damaged, securely fixed, correctly connected, suitable for external influences (134.1.1; 512.2; Section 526)	✓
8.14	Provision of additional protection/requirements by RCD not exceeding 30mA:	N/A
	• Socket-outlets rated at 32 A or less, unless exempt (411.3.3)	"
	• Supplies for mobile equipment with a current rating not exceeding 32 A for use outdoors (411.3.3)	"
	• Cables concealed in walls at a depth of less than 50 mm (522.6.202; 522.6.203)	"
	• Cables concealed in walls/partitions containing metal parts regardless of depth (522.6.202; 522.6.203)	"
	• Final circuits supplying luminaires within domestic (household) premises (411.3.4)	"
8.15	**Presence of appropriate devices for isolation and switching correctly located including:**	
	• Means of switching off for mechanical maintenance (Section 464; 537.3.2)	✓
	• Emergency switching (465.1; 537.3.3)	N/A
	• Functional switching, for control of parts of the installation and current-using equipment (463.1; 537.3.1)	✓
	• Firefighter's switches (537.4)	N/A

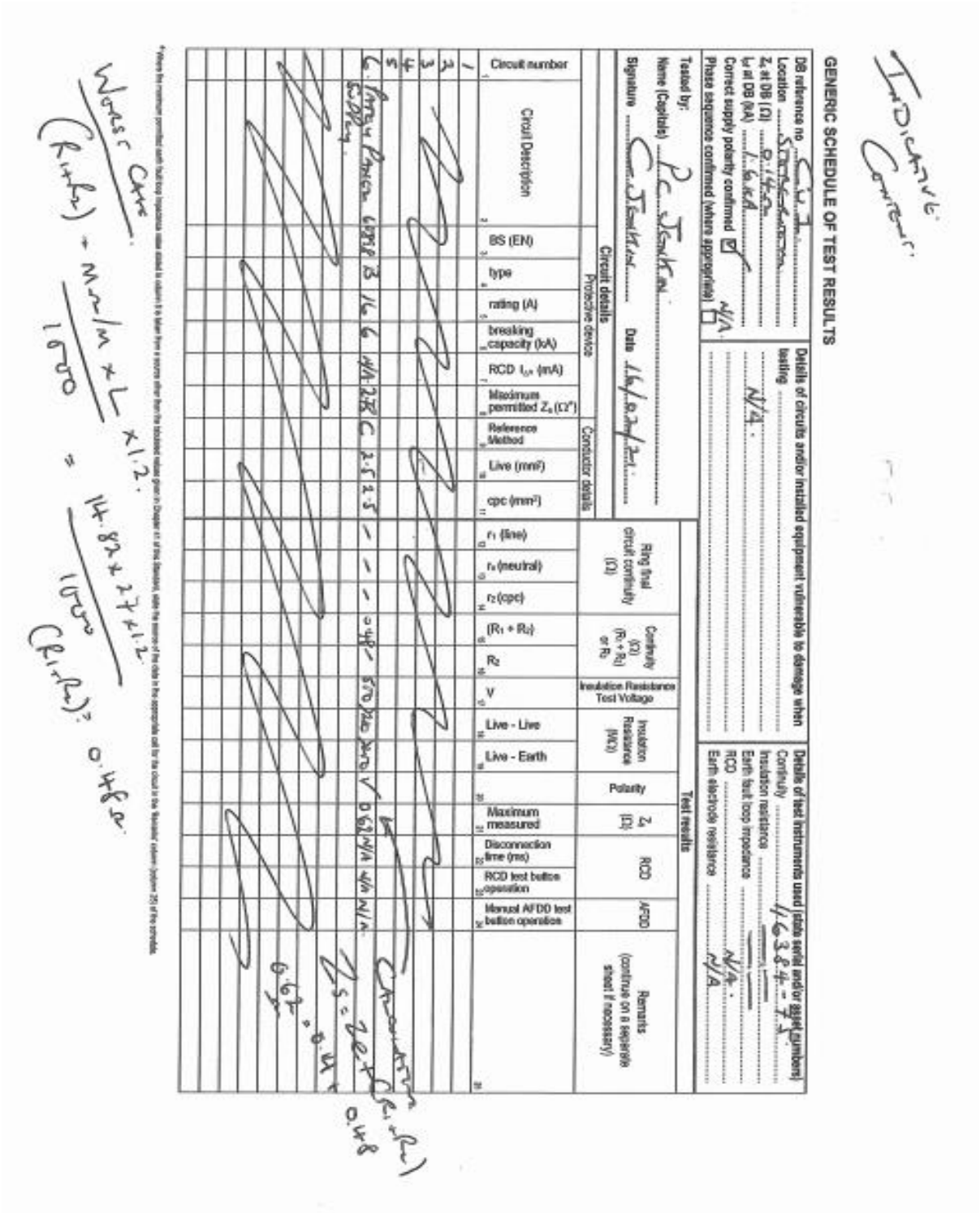
9.0	**CURRENT-USING EQUIPMENT (PERMANENTLY CONNECTED)**	
9.1	Equipment not damaged, securely fixed and suitable for external influences (134.1.1; 416.2; 512.2)	✓
9.2	Provision of overload and/or undervoltage protection e.g. for rotating machines, if required (Sections 445, 552)	N/A
9.3	Installed to minimize the build-up of heat and restrict the spread of fire (421.1.4; 559.4.1)	✓
9.4	Adequacy of working space. Accessibility to equipment (132.12; 513.1)	✓

10.0	**LOCATION(S) CONTAINING A BATH OR SHOWER (SECTION 701)**	
10.1	30 mA RCD protection for all LV circuits, equipment suitable for the zones, supplementary bonding (where required) etc.	N/A

11.0	**OTHER PART 7 SPECIAL INSTALLATIONS OR LOCATIONS**	
11.1	List all other special installations or locations present, if any. (Record separately the results of particular inspections applied)	N/A

Inspected by:

Name (Capitals) P.C. JENKINS **Signature** Clive Jenkins **Date** 16/02/21



GENERIC SCHEDULE OF TEST RESULTS

DB reference no. ..... Details of circuits and/or installed equipment vulnerable to damage when testing

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

Z_s at DB (Ω) .....

I_{pf} at DB (kA) .....

Correct supply polarity confirmed ☑

Phase sequence confirmed (where appropriate) ☐ N/A

Tested by:

Name (Capitals) .....

Signature ..... Date .....

Circuit number	Circuit Description	Circuit details: Protective device: BS (EN)	type	rating (A)	breaking capacity (kA)	RCD $I_{\Delta n}$ (mA)	Maximum permitted Z_s (Ω*)	Conductor details: Reference Method	Live (mm²)	cpc (mm²)	Test results: Ring final circuit continuity (Ω): r_1 (line)	r_n (neutral)	r_2 (cpc)	Continuity (Ω): $(R_1 + R_2)$ or R_2: $(R_1 + R_2)$	R_2	Insulation Resistance Test Voltage: V	Insulation Resistance (MΩ): Live - Live	Live - Earth	Polarity	Z_s (Ω): Maximum measured	RCD: Disconnection time (ms)	RCD test button operation	AFDD: Manual AFDD test button operation	Remarks (continue on a separate sheet if necessary)
1																								
2																								
3																								
4																								
5																								
6	Lighting Circuit	6091B	B	16	6	N/A	2.38	C	2.5	2.5	—	—	—	0.48Ω	0.48Ω	500Vdc	>200MΩ	>200MΩ	✓	0.62Ω	N/A	N/A	N/A	

* Where the maximum permitted earth fault loop impedance value stated in column 9 is taken from a source other than the tabulated values given in Chapter 41 of the Standards, state the source of the data in the appropriate cell for the circuit in the 'Remarks' column (column 20) of the schedule.

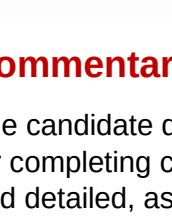
Worst Case:

$$\frac{(R_1+R_2) \times M \times L \times 1.2}{1000} = \frac{14.82 \times 27 \times 1.2}{1000} = 0.48\Omega$$

(R_1+R_2)

0.48

0.62



Commentary

The candidate demonstrates a thorough knowledge and understanding of the requirements for completing certification and schedules and the EIC documents produced are thorough and detailed, as well as set out in a logical order. The documents are easy to follow and accurate in process. Clear justifications and reasoning are provided throughout. Full consideration and accurate use of technical language and terminology throughout the completed EIC. Overall documentation is excellent and fully considers both materials and equipment, and the protection of customer property, including safety and PPE.

Candidate evidence

Task 2 - Statement

Statement relating to the safe, sustainable and legal disposal of equipment

- Ensure you have the correct PPE
- Follow and adhere to all relevant health and safety documentation and regulations
- Collect all fittings that will be necessary, as well as the tools/equipment required to remove redundant components from the installation
- Safely isolate the installation/circuit, before any decommission work commences
- Obtain permission to start work
- Prove that the approved voltage indicator is functioning correctly
- Identify the source(s) of supply using an approved voltage indicator
- Isolate the supply, lock off and retain the key
- Prove the system/equipment is DEAD using an approved voltage indicator
- Prove that the approved voltage indicator is functioning correctly
- Put up warning signs to tell other people that the electrical installation has been isolated
- Once the system/equipment is proved DEAD, work can begin
- Disconnect the redundant switches in a safe working manner.
- Remove all redundant wiring associated with the switches that will not be required
- Remove any redundant containment that will no longer be required
- Make safe all alterations to this circuit and associated containment/enclosures.
- Special attention needs to be given to sustainability and recycling.
- Follow all statutory legal requirements, as stated within the WEEE regulations (Waste from Electrical and Electronic Equipment)

Commentary

The candidate demonstrates a thorough knowledge and understanding of the requirements for creating statements and the statement is logical in sequencing, detailing all aspects of the decommissioning of the redundant lighting switches. The level of detail is accurate demonstrating a comprehensive understanding of the installation processes with the primary focus on the removal of sections of the installation that will no longer be required. The methods described are accurate, providing logical reasoning, as to what actions are to be carried out during this task.

Health and safety has been considered during the preparation and throughout this task.

Full consideration given to the use of technical language and terminology throughout.

Candidate evidence

Task 2 – Decommissioning and safe isolation

Practical Observation Form

Assessment ID	**Qualification number**
8710-352	8710-32
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
City & Guilds	Health and safety, systems and components (Decommissioning and safe isolation)

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

Task	**Notes –** *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Decommissioning and safe isolation	Health and safety is followed during preparation and throughout tasks and all work completed safely. Candidate has ensured all H&S and site preparation works are in place before starting task by putting dust sheets on floor, storing tools and materials in safe location. Correct process and procedures were followed and carried out with accuracy in the allotted assessment timings. The candidate managed their time effectively throughout the process. The candidate did not require any prompting throughout the task. Candidate correctly sourced all the equipment for performing the safe isolation procedure, including signage needed and then requested permission to proceed from the assessor. The candidate correctly checked the testing equipment and confirmed operation and continued to isolate supply correctly. Tests to prove supply was DEAD had been carried out with accuracy and confirmed the installation was safe.

Task	**Notes –** *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
	Candidate completed the task logically, completing each component of the task and moving on to the next stage of the process. Candidate correctly erected relevant signage and placed notices to advise persons that the system was safely isolated and tested. The candidate performed all practical elements of the decommissioning accuracy.

Assessor signature	Date
A. Assessor	**22/2/21**

Commentary

Candidate demonstrates an excellent understanding of the safe isolation and decommissioning process and carried out the necessary steps of the safe isolation procedure and decommissioning of lighting switches correctly. The candidate used correct terminology accurately throughout the assessment.

Health and safety is followed during preparation and throughout tasks and all work completed safely.

Candidate evidence

Task 2 - Installation of electrical and electronic equipment

Practical Observation Form

Assessment ID	Qualification number
8710-352	8710-32
Candidate name	**Candidate number**
Candidate A	CG12345
Centre name	**Assessment theme**
City & Guilds	Health and safety, Systems and components, Reports and information, Inspecting and testing of 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	Health and safety procedures were followed accurately throughout. Candidate has ensured all H&S and site preparation works are in place before starting task by putting dust sheets on floor, storing tools and materials in safe location. Candidate follows correct process for the installation of system. Installation is to industry standards and is completed confidently and in a timely manner. Work area measured accurately in line with diagram. Marking out accurate without error. Component selection is appropriate and clearly links to the quality of finished installation. Highly competent in installation skills which is demonstrated in the quality of the finished installation. Excellent use of tools resulting in a high-quality installation. Reference made to manufacturer's instructions at all appropriate stages during the installation. Measurement of wiring and associated component installation is accurate and meets the design specification and is within tolerance without undue waste. Candidate requires no prompts or reassurance throughout all tasks. Inspection and testing is to industry standards and is completed in a timely manner. Use of tools is excellent resulting in a high-quality installation. Candidate follows correct process for the inspection and testing of circuits. Candidate has no gaps in the completion of the electrical installation certificate. Candidate follows correct process for the configuration of the circuits with all necessary software, firmware and hardware in accordance with manufacturer's information. Highly competent in installation skills which is demonstrated in the quality of the finished installation Tolerances have been met with overall installation of a high-quality finish.

Assessor signature	**Date**
B. Assessor	**22/2/21**

Photographic evidence Task 2 – Installation

Evidence of the installation at one-hour stages showing progression. Photographs should only show the installation wall/board and not the candidate (photograph 1-4)

Photo: 1	Image shows the candidate is on schedule with timings at first stage. All the marking out of containment, components and equipment completed accurately and appropriately. Candidate commenced the installation of some additional containment (Dado trunking). Excellent use of tools, when fabricating task containment.
Photo: 2	Image shows the candidate has completed the installation of the SWA cabling with extreme accuracy and precision. Excellent use of tools evident with the quality of termination and glanding of the SWA cabling. The candidate is within timings at this second stage.
Photo: 3	Image shows the candidate has completed the installation of the SWA and termination of both ends, neatly and with excellent accuracy. The candidate has mounted most of the smart components, correctly and accurately. The candidate is within timings at this third stage.

Photo: 4	Image shows the candidate has completed the installation of the containment, components, equipment and cabling, which includes the termination of SWA at both ends. In the required time to a very high-quality standard finish. All the smart Control switches have been mounted at this point. The candidate is within timings at this fourth stage.
Photo: 5	Image shows the completed installation showing all the containment, components and equipment, as a completed install/build. The candidate displayed an excellent final product, which is accurate to measurements, and is extremely neat. Excellent attention to detail evident.
Photo: 6	Image shows the inside of the distribution board, so that all wiring and connections can be seen and reviewed. Excellent quality displayed, conductors and terminations are extremely neat and accurate. The photo also shows the SWA termination and connections for the designed 06 circuit. This circuit is designated for the supply socket-outlet, serving the patch panel equipment.

Commentary

Candidate demonstrates an excellent understanding of the installation requirements for the task. The candidate demonstrated an ability to sequence tasks logically, indicating a solid understanding of installing and commissioning the electrical and electronic equipment and systems as stated within the assignment brief without support.

Candidate follows correct and logical processes for the installation of all components, containment and equipment in this system.

The candidate demonstrates they can follow measurements accurately from an allocated work area, in line with their installation diagram.

The candidate demonstrated excellent accuracy when marking, cutting and installing materials.

Throughout the installation task the candidate showed accuracy, working within set tolerances.

All health and safety procedures were followed and adhered throughout this installation task.

Task 3 – Carry out maintenance

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

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

- Carry out in-service inspection and testing on a range of 5 items of electrical and electronic equipment belonging to the client and provided by the assessor
- Documentation as required by IET CoP ISITEE

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

- Documentation as required by IET CoP ISITEE

Note: For the purpose of this GSEM only 4 items are presented in the documentation

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 inspection and testing

Photographic evidence required:

- Photograph of each item of equipment under test (any test within the range). This is to record the equipment under test and must align with the equipment register.

Candidate evidence

Task 3 - Documentation required by IET CoP ISITEE
Inspection and testing record

INDICATIVE CONTENT ONLY

Form V.2 Equipment formal visual and combined inspection and test record

Inspector (Note 1)	Name:	CLIVE JENKINS	Client: (Note 2)	CITY & GUILDS T-LEVELS.	
	Organization:	CITY & GUILDS.			
	Date:	16/02/2021			

Item		Note	Item 1	Item 2	Item 3	Item 4
Equipment ID No.		3	01	02	03	04
Description		4	KETTLE	DRILL	EX LEAD	HEATER.
Construction Class		5	II	II	II	I
Type (S, IT, M, P, H, F)		6	P	P	P	P.
Location		7	office	office	office	office.
Frequency	Formal Visual Insp.	8	WEEKLY	WEEKLY	WEEKLY	WEEKLY
	Combined Inspection & Test	9	1 YEAR	1 YEAR	1 YEAR	1 YEAR
Make		10	KENWOOD	DEWALT	MAKITA	GLEN.
Model			0072	DW07	SR6V	07
Serial No.			12345.	678910	19W12.	7373.
Voltage (V) (if different from 230 V)		11	230 ✓	230 ✓	230 ✓	230 ✓
Rating (watts or A)		12	10.5A	8A	13A.	13A.
Fuse (A)		13	13A.	13A	13A	13A
Condition of: (✓ or ×)	Socket-outlet	14	✓	✓	✓	✓
	Plug	14	✓	✓	✓	✓
	Flex	14	✓	✓	✓	✓
	Body	14	✓	✓	✓	✓
	Other (please state)	14	N/A	N/A	N/A	N/A.
Test Results	Continuity (Ω)	15(i)	0.1	0.14	0.12	0.1
	Insulation Resistance (MΩ)	15(ii)	>1000	>1000	>1000	>1000.
	Polarity ✓ or ×	15(iii)	✓	✓	✓	✓
	Function ✓ or ×	15(iv)	✓	✓	✓	✓
	Other (please state)	15(v)	N/A	N/A	N/A	N/A.
Suitable for environment (Y or N)		16	Y	Y	Y	Y
Comments		17				
Suitable for continued use (Y or N)		18	Y	Y	Y	Y.
Initials		19	CJ	CJ	CJ	CJ.

Note: (✓) indicates pass, (×) indicates fail, (N/A) not applicable, (N/C) not checked

Commentary

Candidate demonstrates a thorough understanding of the documentation requirements for the maintenance task. The inspection record is clear and detailed, with a new equipment register being compiled and supplied as part of the required paperwork. The manufacturer's instructions have clearly been used throughout the completion of the inspection record.

Full consideration and accurate use of technical language and terminology throughout the completed record and the documentation fully considers all materials and equipment, including safety and PPE.

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