

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

**Electrical and Electronic
Equipment Engineering**

**Guide standard exemplification material
Threshold competence – Sample 2021**

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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 minimal threshold competence. In this document all exemplar evidence attests as examples of minimal threshold competence. The examples provided do not reflect all evidence from the sample assignment as the focus of this material is the quality and standards that need to be achieved rather than the volume of exemplar evidence provided. However, the examples 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 minimal threshold competence.

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

Grade descriptors

To achieve a pass (threshold competence), a candidate will be able to:

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

Demonstrate the adequate technical skills for installing components that is in line with industry standards.

Interpret information, demonstrate planning, assess risk and follow safe working methods when applying practical skills to an acceptable standard as recognised by industry.

Demonstrate basic knowledge and understanding of the principles and processes required for Electrical and Electronic Equipment Engineering.

Work safely showing an understanding in the selection and use of tools and equipment and demonstrate a basic awareness of straightforward preparation and application processes.

Attempt some complex tasks and the level of performance mostly meets an acceptable level.

Identify causes of faults and have some knowledge and skills in how to rectify them.

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

DRAFT

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 °C
- 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.

- Assessors 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 |
|--|----------|--|--|---|---------|-------------------|-------------|
|  <p>TP-LINK RE200 WiFi Range Extender - AC 750, Dual-band</p> | | <ul style="list-style-type: none"> Boost your WiFi signal further AC 750 Dual-band (2.4 GHz + 5 GHz) One Ethernet port Plugs into a spare plug socket | <p>Top features:</p> <ul style="list-style-type: none"> Next-generation WiFi gives you higher speeds Dual-band WiFi with Ethernet connectivity Practical range extending with indicator lights <p>Next-generation WiFi</p> <p>Dual-band WiFi</p> <p>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.</p> <p>Practical range extending</p> | <p>OVERVIEW</p> <p>Type- Wall plug range extender</p> <p>Rating- AC 750</p> <p>Data transfer speed - Up to 750 Mbps</p> <p>Wireless band - Dual-band (2.4 GHz + 5 GHz)</p> <p>CONNECTIVITY</p> <ul style="list-style-type: none"> Extender RJ-45 Ethernet cable Quick installation guide <p>Dimensions- 110 x 65.8 x 75.2 mm (H x W x D)</p> <p>Weight 100 g</p> <p>Manufacturer's guarantee 3 years</p> | £22.99. | 1 | |
|  | TLC | <p>Suitable for Combi Boilers</p> <p>LED Display</p> <p>Suitable for Gas, LPG, Oil & Some Electric Boilers</p> <p>6 Daily Schedule Time Slots</p> | <p>6-Hour Heating Boost Function</p> <p>Automatic Frost Protection</p> <p>Child Lock</p> | | £99 | 1 | |
|  | TLC | | <p>Control and schedule power in the home or outside via touch, voice commands or app. No need for a hub, cloud costs or subscription.</p> | <p>Quick and easy set-up, with in-App support. Set timer schedules, countdown function or random security options.</p> | £15 | | £15 |

| Product | Supplier | Product features | Product information | Specification | Price | Quantity required | Total Price |
|--|----------|---|---|---|-------|-------------------|-------------|
|  | 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 | £80 | 1 | |
|  | 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. | | £40 | | £40 |
|  | 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.

Commentary

The candidate demonstrates sound knowledge and understanding by producing a product list that is clear and details the key items required for the task, although not always logical in sequence. However, some resource products and components are missing and some detail is lacking in the descriptions. For example, the wireless switch receiver information offers some, but limited detail. Not all product quantities are accurate with some over estimation in parts.

The candidate has given sound consideration to the 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, which will encompass relevant product requirements, which should be in line with associated legislation.

Candidate has given some justification for their choices, although limited in parts.

Health and safety has been reasonably considered during this task.

Candidate evidence

Task 1 - Materials list

| Equipment/Materials | Quantity |
|--|-----------|
| Adaptable boxes containing three terminals | 2 |
| Two-port central heating valve | 1 |
| Heating control wiring centre | 1 |
| Smart programmable room thermostat with control unit | 1 |
| 3-compartment trunking | |
| T joint for trunking | 1 |
| 6 data outlets | 2 |
| RJ45 connectors | |
| Mini Trunking | 2 meters |
| YT2 flat bend | 2 |
| 3-core SWA cable | 2 metres |
| gland pack | |
| Metal-clad surface 2-gang 13 A switched socket-outlet | 1 |
| Surface mounted occupancy switch | 2 |
| on/off wireless switches | |
| dimmer wireless switch | 1 |
| wireless switch receivers; one capable of multi-switch one capable of dimming | 2 |
| smart controlled 13 A socket-outlets | 2 |
| Wi-Fi extender | 1 |
| Broadband router | 1 |
| Isolator BSEN 60309 (Metal clad) | 1 |
| Range of flexible cable suitable for connecting heating equipment and cables for connecting switch receivers | A drum |
| Tools and Plant | |
| Marking tool/Pencil | 1 |
| Tape measure | 1 |
| Power Drill (Battery/Mains) | 1 |
| 20mm Hole cutter/saw | 1 |
| Hacksaw | 1 |
| Side cutters | 1 |
| Pliers | 1 |
| VDE Screwdriver | selection |
| Cable/wire strippers | 1 |

| | |
|---------------------------------------|---|
| Hammer | 1 |
| Spirit levels | 2 |
| Testing instrument (Multi-functional) | 1 |
| AVI (approved voltage indicator) | 1 |
| | |
| PPE | |
| Overalls/protective clothing | |
| Steel toe capped boots | |
| Goggles/glasses | |

Commentary

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

Materials list includes all of the key components, separating tools and equipment to perform the tasks correctly. Quantities have been included but some details are not accurate. For example, the amount of RJ45 connectors required and the omission of SWA gland size and quantity.

The candidate demonstrates a good understanding of health and safety and listed the PPE required logically to carry out the tasks safely.

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 (Thermoplastic 70°C) |
| Design current | 16 |
| Type and Nominal Rating (In) | 16 A |
| Length | 27m |
| Installation method | Clipped direct |
| Ambient Temperature | 25 °C |
| Rating factor Ambient air temp | 1.02 (On-site guide) |
| Total circuits in group | 1 |
| Rating factor for grouping | 1 (p152 table F1) |
| Minimum current capacity | 16 A |
| 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 230V(11.5V) |

Formula, calculations and literature referencing (Page numbers and tables used) shown and stated

$I_z > I_n / CF$
 $V_d = mV/A/m \times I_b \times L/1000$

Commentary

The candidate shows good knowledge and understanding creating a circuit design schedule with reasonable accuracy and detail. The schedule identifies the majority of relevant design information required to successfully complete the electrical design for this circuit. The candidate has shown sound knowledge and understanding of the design process by successfully completing all parts of the design schedule.

There are some omissions with limited recording and usage of electrical literature found with page numbers and tables not always accurately referenced. The factor for the ambient temperature has limited reference and there is not a page number to illustrate where this information would be found. However, design criteria has been accurately completed with most necessary calculations made and shown, in line with BS7671 and the assignment brief requirements.

Limited justifications and reasoning are provided throughout. Some consideration of technical language, and terminology, has been used in parts but not extensively.

Candidate evidence

Task 1 - Risk assessment

| Activity: Risk assessment in accordance with regulation 411.3.3 of BS 7671 – Removal of RCD Protection | | Date: 12 2 2021 | | Position: | | | | |
|---|---------------------------|-----------------------------|-----------------|----------------------------------|--|----------|----|---------------------------|
| Location: Workspace | | | | | | | | |
| SEVERITY (S): Degree of harm which may be caused (including numbers affected) | | | | | RISK RATING (RR): Severity x Likelihood | | | |
| 1 Minor Injury 2 Major Injury 3 Fatality | | | | | 1-2 Low | | | |
| LIKELIHOOD (L): Probability that event will occur | | | | | 3-5 Medium | | | |
| 1 Remote 2 Possible 3 Likely | | | | | 6-9 High | | | |
| Item No: | Activity: | Hazard | Persons at Risk | Existing Controls (Mitigation) | S 1-3 | L 1-3 | RR | Are the Risks Controlled? |
| 1 | Removal of RCD Protection | Usage of Client's equipment | Staff | Relevant product training needed | 2 | | 5 | Y |

| | | | | | | | | |
|--|---------------------------|---|-------|---|-----|---|---|---|
| | Removal of RCD Protection | Socket misuse leading to electric shock | Staff | Suitable training and instruction given, in relation to what equipment only, must be sourced through/by this socket outlet. | 3 | 1 | | |
| | Removal of RCD Protection | User | User | Appropriate training and component instruction given to users. Explain the restrictions associated with the socket-outlet | 2/3 | 1 | 5 | Y |

Commentary

The candidate demonstrates a good knowledge and understanding of the different types of risks and hazards associated with regulation 411.3.3 of BS 7671. The candidate has identified the major hazards and associated risks for the regulation but did not take into consideration contamination and did not take into account regular user checks.

The candidate demonstrates some understanding of the mitigations that can be used to minimise the identified risks and hazards and has attempted to identify controls, although these are somewhat brief. For example, the candidate has limited detail, in relation to the control measures required for socket misuse. More detail required, as to socket identification and labelling needed.

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

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

| ELECTRICAL INSTALLATION CERTIFICATE (REQUIREMENTS FOR ELECTRICAL INSTALLATIONS - BS 7671 (IET WIRING REGULATIONS)) | |
|--|--|
| DETAILS OF THE CLIENT <u>City & Guilds</u> | |
| INSTALLATION ADDRESS <u>LONDON</u> | |
| DESCRIPTION AND EXTENT OF THE INSTALLATION Description of installation: <u>office</u> | New installation <input type="checkbox"/> |
| Extent of installation covered by this Certificate: <u>CIRCUIT NOB (ONLY)</u> | Addition to an existing installation <input checked="" type="checkbox"/> |
| | Alteration to an existing installation <input type="checkbox"/> |
| (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 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 <u>NA</u> (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 <input checked="" type="checkbox"/> | |
| 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: <u>PC JENKIN</u> Date: <u>16.02.21</u> Name (IN BLOCK LETTERS): <u>CLIVE JENKIN</u> 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 <u>NA</u> (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 is limited to the work described above as the subject of this Certificate. | |
| For CONSTRUCTION of the installation: | |
| Signature: <u>PC JENKIN</u> Date: <u>16.02.21</u> Name (IN BLOCK LETTERS): <u>CLIVE JENKIN</u> 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 (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 is limited to the work described above as the subject of this Certificate. | |
| For INSPECTION AND TESTING of the installation: | |
| Signature: <u>PC JENKIN</u> Date: <u>16.02.21</u> Name (IN BLOCK LETTERS): <u>CLIVE JENKIN</u> Inspector | |
| NEXT INSPECTION I/We the designer(s), recommend that this installation is further inspected and tested after an interval of not more than <u>5</u> years/months. | |

| PARTICULARS OF SIGNATORIES TO THE ELECTRICAL INSTALLATION CERTIFICATE | | | |
|---|--|---|--|
| Designer (No 1) | | | |
| Name: | CLIVE JENKIN | Company: | UNISON INSULATION |
| Address: | L. GARRISON COSTERMOUTH | Postcode: | CA99 1ER |
| | | Tel No: | 01234 56780 |
| Designer (No 2) (if applicable) | | | |
| Name: | N/A | Company: | |
| 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 |
| TN-C <input type="checkbox"/> | AC <input type="checkbox"/> | DC <input type="checkbox"/> | Nominal voltage, U / U ₀ ⁽¹⁾ ... 230 V |
| TN-S <input checked="" type="checkbox"/> | 1-phase, 2-wire <input checked="" type="checkbox"/> | 2-wire <input type="checkbox"/> | Nominal frequency, f ⁽¹⁾ ... 50 Hz |
| TN-C-S <input type="checkbox"/> | 2-phase, 3-wire <input type="checkbox"/> | 3-wire <input type="checkbox"/> | Prospective fault current, I _p ⁽²⁾ ... 6 kA |
| TT <input type="checkbox"/> | 3-phase, 3-wire <input type="checkbox"/> | Other <input type="checkbox"/> | External loop impedance, Z _e ⁽²⁾ ... Ω |
| IT <input type="checkbox"/> | 3-phase, 4-wire <input type="checkbox"/> | | (Note: (1) by enquiry (2) by enquiry or by measurement) |
| | Confirmation of supply polarity <input type="checkbox"/> | | |
| Other sources of supply (as detailed on attached schedule) <input type="checkbox"/> | | | |
| PARTICULARS OF INSTALLATION REFERRED TO IN THE CERTIFICATE | | | |
| Means of Earthing | | Maximum Demand | |
| Distributor's facility <input checked="" type="checkbox"/> | Maximum demand (load) ... 60/80 kVA / Amps Delete as appropriate | | |
| Installation earth electrode | | Details of Installation Earth Electrode (where applicable) | |
| Installation earth electrode <input type="checkbox"/> | Type (e.g. rod(s), tape etc) ... | | |
| | Location ... N/A | | |
| | Electrode resistance to Earth ... Ω | | |
| Main Protective Conductors | | | |
| Earthing conductor | | Material ... Cu | Connection / continuity verified <input checked="" type="checkbox"/> |
| Main protective bonding conductors (to extraneous-conductive-parts) | | Material ... Cu | Connection / continuity verified <input checked="" type="checkbox"/> |
| To water installation pipes <input checked="" type="checkbox"/> | To gas installation pipes <input checked="" type="checkbox"/> | To oil installation pipes <input type="checkbox"/> | To structural steel <input type="checkbox"/> |
| To lightning protection <input type="checkbox"/> | To other <input type="checkbox"/> Specify ... | | |
| Main Switch / Switch-Fuse / Circuit-Breaker / RCD | | | |
| Location ... <u>Street Room</u> | Current rating ... 100 A | If RCD main switch | |
| Location ... <u>Garage Room</u> | Fuse / device rating or setting ... A | Rated residual operating current (I _{Δn}) ... mA | |
| BS(EN) ... 60947-3 | Voltage rating ... 230 V | Rated time delay ... ms | |
| No of poles ... 2 | | Measured operating time ... ms | |
| COMMENTS ON EXISTING INSTALLATION (in the case of an addition or alteration see Regulation 644.1.2) | | | |
| | | | |
| | | | |
| | | | |
| SCHEDULES | | | |
| The attached Schedules are part of this document and this Certificate is valid only when they are attached to it. | | | |
| Schedules of Inspections and 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) | |
| 2.0 | PARALLEL OR SWITCHED ALTERNATIVE SOURCES OF SUPPLY | |
| 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) | |
| 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 | ✓ |
| | • Supplementary bonding (415.2; Part 7) | |
| 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) | |

| 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) | |
| | • 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 | |
| | • 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) | ✓ |
| 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 live 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) | |
| | • 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. Jenkins

Signature

Clive Jenkins

Date

16.02.21

Insulation Resistance

GENERIC SCHEDULE OF TEST RESULTS

| | |
|---|--|
| <p>DB reference no <u>CUT</u></p> <p>Location <u>Storeroom</u></p> <p>Z_e at DB (Ω) <u>0.142</u></p> <p>I_n at DB (kA) <u>1.6</u></p> <p>Correct supply polarity confirmed <input checked="" type="checkbox"/></p> <p>Phase sequence confirmed (where appropriate) <input type="checkbox"/></p> | <p>Details of test instruments used (state serial and/or asset numbers)</p> <p>Continuity <u>116384-75</u></p> <p>Insulation resistance _____</p> <p>Earth fault loop impedance _____</p> <p>RCD _____</p> <p>Earth electrode resistance _____</p> |
|---|--|

Tested by: P.C. Jenkins

Name (Capitals) P.C. Jenkins

Signature P.C. Jenkins Date 16.03.21

| Circuit number | Circuit details | | | | Conductor details | | | | Test results | | | | | | | Remarks (continue on a separate sheet if necessary) | | | | | | | | | |
|----------------|-----------------|---|---|---|-------------------|---|---|---|--------------|----|----|----|----|----|----|--|----|----|----|----|----|----|----|----|----|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | |

* Where the minimum permitted earth loop impedance value stated in column 8 is taken from a source other than the tabulated values given in Chapter 41 of this Standard, state the source of the data in the appropriate cell for the circuit in the 'Remarks' column (column 25) of the schedule.

Commentary

The candidate demonstrates a good knowledge and understanding of the requirements for completing certification and schedules and the EIC documents produced show a good level of detail, although there are minor gaps. The schedule of inspections has missing text to items that would need to be inspected. Also, the type of supply main protective device is omitted. The documents are easy to follow, with slight inaccuracies, such as units not always being shown.

Justifications and reasoning are not always clear with gaps in the completed documentation. Accurate use of technical language and terminology, although not used extensively. Overall documentation is sound and 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
- Collect all fittings that will be necessary, as well as the tools/equipment required to remove redundant components from the installation
- Safely isolate installation/circuit
- 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.
- Special attention needs to be given to sustainability and recycling.

Commentary

The candidate demonstrates a good knowledge and understanding of the requirements for creating statements and the statement is logical in sequencing, detailing most aspects of the decommissioning of the redundant lighting switches. The level of detail was mainly accurate with sound understanding of the installation processes, with primary focus on the removal of sections of the installation that will no longer be required. The majority of methods described are accurate providing some logical reasoning as to what actions are to be carried out during this task, although the candidate has not fully stated the safe isolation procedure or referenced the WEEE regulations.

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

Some consideration given to the use of technical language and terminology are used 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 – <i>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.</i> |
| Decommissioning and safe isolation | <p>Health and safety is followed during preparation and throughout tasks and all work completed safely. Risks and hazards that occur during the tasks are mitigated against as they arise. Candidate has ensured all H&S and site preparation works are in place before starting task.</p> <p>Process and procedures were followed and carried out with some accuracy in the allotted assessment timings.</p> <p>Candidate correctly sourced all the equipment for performing the safe isolation procedure, including signage needed and then requested permission to proceed from the assessor.</p> <p>The candidate correctly checked the testing equipment and confirmed operation and continued to isolate supply correctly.</p> <p>The candidate identified the correct terminals to test to prove supply was DEAD had been carried out with accuracy and confirmed the installation was safe.</p> <p>Candidate erected relevant signage and placed notices to advise persons that the system was safely isolated and tested.</p> |

| | |
|-------------|---|
| Task | Notes – <i>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.</i> |
| | The candidate performed all the elements of the decommissioning required but was reviewed their method statement frequently to assure themselves of task requirements but worked through the task to complete it correctly. |

| | |
|---------------------------|-------------|
| Assessor signature | Date |
| A. Assessor | 22/2/21 |

Commentary

Candidate demonstrates a good 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 showed a sound level of knowledge and understanding and used accurate terminology and health & safety was considered and followed throughout the task.

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 – <i>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.</i> |
| Installation | <p>Health and safety procedures were followed throughout. Candidate has ensured all H&S and site preparation works are in place before starting task.</p> <p>Work area measured accurately in line with diagram. Marking out accurate bar small and minor omissions.</p> <p>Candidate follows correct process for the installation of system. The candidate sequenced the tasks logically. Installation is to industry standards and is completed in a timely manner. Component selection is appropriate but limited and has some links to the quality of finished installation.</p> <p>Candidate referred to manufacturer's instructions at appropriate stages during the installation and when setting up the devices.</p> <p>Measurement of wiring and associated component installation showed some inaccuracies. Candidate was hesitant and did not fully plan the cutting of the trunk, leaving surfaces cluttered.</p> <p>Inspection and testing is to industry standards and is completed in a timely manner.</p> <p>Use of tools is to a reasonable standard, with just a little awkwardness when using the saw but still producing a justly installation.</p> <p>Candidate follows correct process for the inspection and testing of circuits.</p> <p>Candidate has some gaps in the completion of the electrical installation certificate.</p> <p>Slight prompt/reassurance required during the wiring and configuration of accessories.</p> <p>Candidate follows some correct process for the configuration of the circuits with all necessary software, firmware and hardware in accordance with manufacturer's information.</p> <p>Reference was made to manufacturer's instructions at appropriate stages during the installation and application of software.</p> <p>Installation skills were to an acceptable standard demonstrated through the fabrication of containment and wiring systems as see in the finished installation.</p> <p>Whilst there are some inaccuracies/gaps, most tolerances have been met with overall installation of a sound quality finish.</p> |

| | |
|---------------------------|----------------|
| 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)



Image shows the candidate is slightly behind the approximate timings, at this stage. The candidate has completed the marking out of components and equipment, although there are some minor inaccuracies. The candidate has also commenced the installation of some additional containment (Dado trunking). The install of the Dado containment looks neatly fabricated, although not quite level.

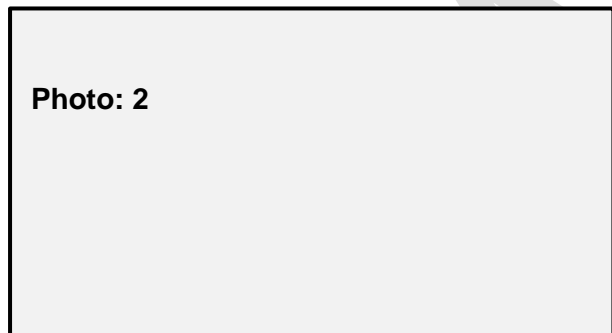


Image shows the Dado containment has been fully fixed and fabricated. The candidate has now commenced the installation of the SWA cabling. The candidate has measured and cut the correct length of SWA cabling to be installed. Correct use of tools is evident. One cable end has been appropriately terminated, although the length of the conductors should be longer, showing minor inaccuracy. Candidate is also slightly behind the timings at this stage.

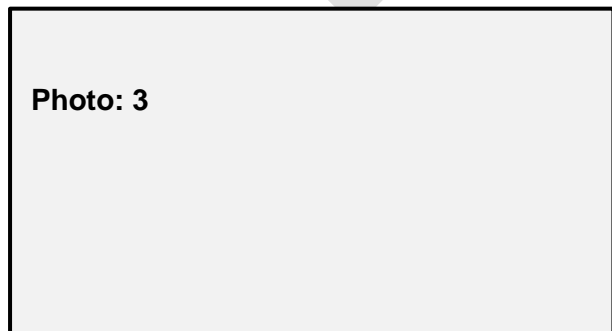


Image shows the candidate has completed the installation of most of the SWA cabling, although the cable is not fully terminated at both ends. The candidate has started to fix the cable cleats to secure the cabling, although cleat distances are not consistent, showing some inaccuracies.

Photo: 4

Image shows the completed installation, detailing all the containment, wiring/cabling, components and equipment. Overall the install displays a reasonable quality finish with some minor inaccuracies with measurement mostly in tolerances and a couple of components not looking quite level

Photo: 5

Image shows the inside of the distribution board, so that all wiring and connections can be seen and reviewed. The photo show the SWA termination and connections for the designed 06 circuit. This circuit is designated for the supply socket-outlet, serving the patch panel equipment. The candidate has correctly terminated all necessary circuits within the distribution board, although the quality of finish could be better. The conductors for termination are a little short.

Photo: 6

Image shows the inside of the distribution board, so that all wiring and connections can be seen and reviewed. 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 a good understanding of the installation requirements for the task. The correct process is followed and the candidate demonstrates an ability to sequence tasks logically as set out in their method statement for the installation of all components/containment and equipment in this system.

The candidate demonstrates they can follow measurements with accuracy from an allocated work area, in line with their installation diagram. The candidate demonstrated accuracy when marking, cutting and installing materials bar small omissions.

Throughout the installation task the candidate showed working mostly within set tolerances. All health and safety procedures were followed during this installation task.

Candidate did require reassurance when carrying out the installation, for example wiring and configuring the accessories first time showing some inaccuracies and during inspection and testing of the installation.

DRAFT

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

| Form V.2 Equipment formal visual and combined inspection and test record | | | | | | |
|--|----------------------------|---------|-----------------------|-----------|--------|--------|
| Inspector (Note 1) | Name: CLIVE JENKINS | | Client: City & Guilds | | | |
| | Organization: | | T-LEVELS. | | | |
| | 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 | EXT LIGHT | HEATER | |
| Construction Class | 5 | II | II | | | |
| Type (S, IT, M, P, H, F) | 6 | P | | | P | |
| Location | 7 | OFFICE | | OFFICE | | |
| Frequency | Formal Visual Insp. | 8 | WEEKLY | WEEKLY | WEEKLY | WEEKLY |
| | Combined Inspection & Test | 9 | 1 YEAR | 1 YEAR | | 1 YEAR |
| Make | 10 | KENWOOD | DEWALT | MASKA | FLUX | |
| Model | | 0012 | DW01 | SR6U | 07 | |
| Serial No. | | 12345 | 678910 | 19N12 | 7373 | |
| Voltage (V) (if different from 230 V) | 11 | 230V | 230V | 230V | 230V | |
| Rating (watts or A) | 12 | 10 | 8 | | 13 | |
| Fuse (A) | 13 | 13A | 13 | 13 | 13 | |
| Condition of: (✓ or ✗) | Socket-outlet | 14 | ✓ | ✓ | | ✓ |
| | Plug | 14 | ✓ | ✓ | ✓ | ✓ |
| | Flex | 14 | ✓ | ✓ | | ✓ |
| | Body | 14 | ✓ | ✓ | | |
| | Other (please state) | 14 | | | | |
| Test Results | Continuity (Ω) | 15(i) | 0.1 | 0.14 | | 0.1 |
| | Insulation Resistance (MΩ) | 15(ii) | >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 good understanding of the documentation requirements for the maintenance task. The inspection record is clear and detailed in parts, with a new equipment register being compiled and supplied as part of the required paperwork. The manufacturer's instructions have been used in the completion of the inspection record apart from some omissions including the type of equipment being tested that has not been completed for both the drill and heater items. Also, the condition of the item extension lead has not been fully completed leaving gaps.

Accurate use of technical language and terminology given although not used extensively and the documentation considers the majority of both materials and equipment, including safety and PPE.

DRAFT

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