Preparing for the National Qualifying Heats

Examples of technical drawings and task information

By the end of April, all candidates who entered SkillELECTRIC will know whether they have progressed to the National Qualifying heats.

To help those successful prepare for the heats, we have produced this guide which will allow you to score and benchmark their work and refine their performance.

Being in a competitive environment is not natural to most people. With this in mind, we suggest that you use these tasks to check that your potential competitors:

- Takes their time to read technical drawings and really understand what they are being asked to do.
- Takes notes and have a mental plan of where marks can be gained and lost.
- Plan how they and in what order they will approach the task.
- Are prepared and organised, do they have all the necessary tools to hand or are they walking to their tool box repeatedly for different things?
- Concentrates throughout the task and works to high a high level of accuracy. If not, why is this?
- Becomes familiar with working in unfamiliar environments and processes and overcomes their nerves to remain focused.

For both examples, competitors are expected to:

- Comply with all Health and Safety legislation and requirements for competition.
- Install the competition piece to industry standards in a safe and orderly manner.
- Eye protection must be worn for all drilling and cutting.
- Complete the exercise with the materials provided.
- Work to the dimensions included on the diagram with a tolerance of +/- 4mm.
- Determine all necessary wiring for the correct installation and operation of equipment as described in the specification.
- Carry out dead electrical safety tests and record your readings on the test results sheet to prove the installation is safe to energise prior to requesting live testing.

Materials and tools

Please supply all the tools and equipment for which to complete this task including; hand tools, test equipment, bending springs, cutting blocks, handsaws, draw tapes, spare blades, containment systems, cable and wiring accessories etc. Competitors can use their own tools if they prefer. Battery tools for drilling are acceptable and facilities for charging batteries will be available.

Also: Look out for the SkillELECTRIC Training to Succeed Manual which will launch soon. It's to be used in conjunction with the competition training and development that competitors receive from their supporting provider and/or employer for all stages of the competition. It contains technical tips and advice to enable competitors to achieve their full potential and be competition ready.

Example A

The exercise is a PVC conduit, PVC/PVC, and SWA installation with the following 3 circuits:

Circuit 1: 20A radial circuit feeding a switched fused connection unit (CU1) wired in PVC/PVC insulated cable.

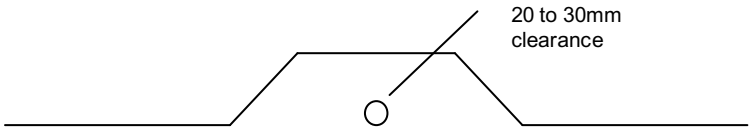
Circuit 2: 20A general power circuit feeding one single metal clad switch socket outlet (S01) wired in 2-core SWA cable.

Circuit 3: 6A lighting circuit wired in single PVC insulated cable enclosed in PVC conduit. The circuit consists of 2 lighting points. LT1 is controlled by two-way switching, SW1 and the left-hand side of SW2. LT2 is controlled by a one-way switch, right hand side of the two-gang switch (SW2).

Materials list

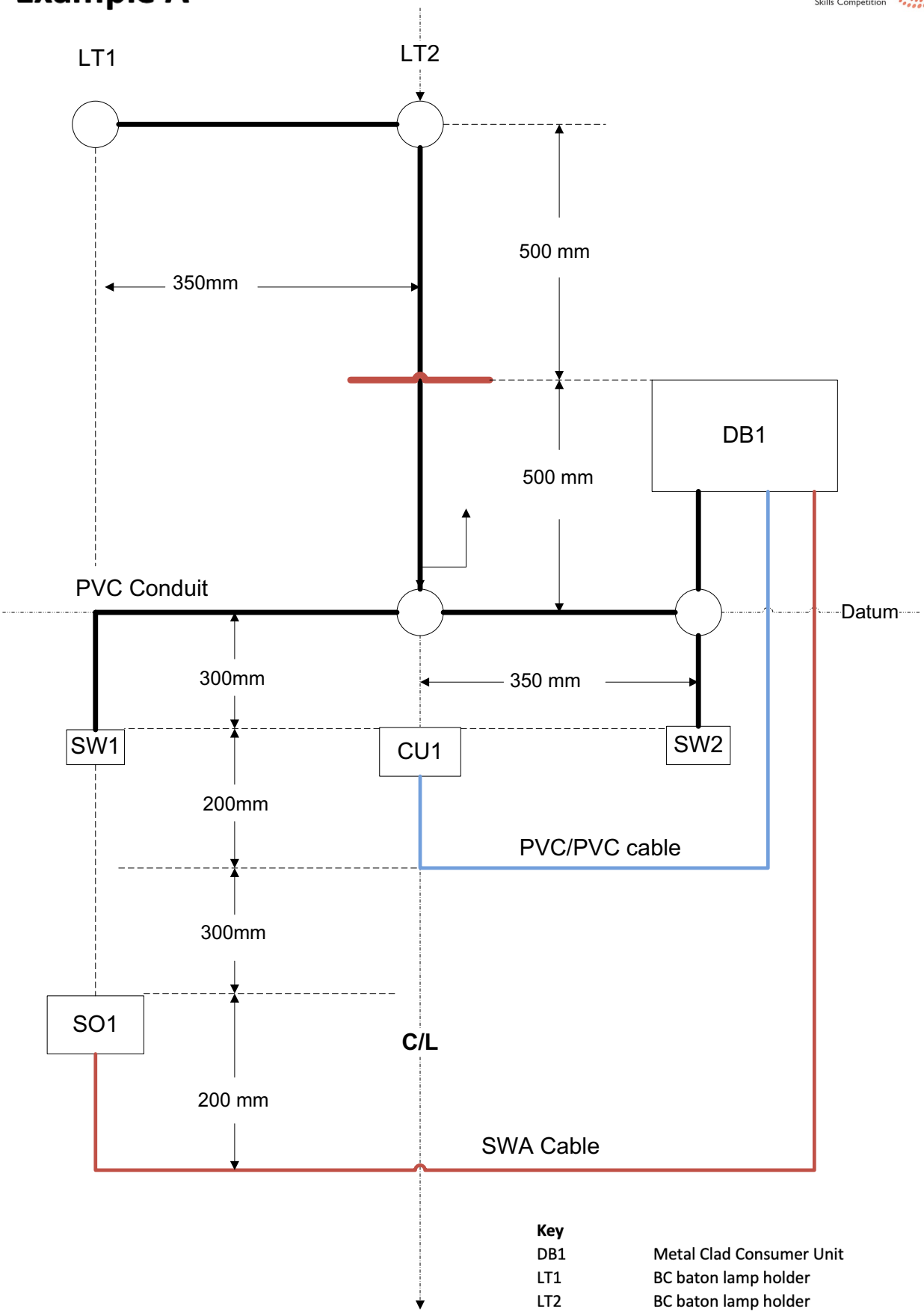
Description	Quantity
Metal clad 4-way DB	1
6A MCB	1
16A MCB	2
MCB Blank	1
2 gang 2-way switch	1
2-way switch	1
Switch pattress PVC with 20mm knockout	2
13A fused connection unit	1
Pattress for above with 20mm knock out	1
Metal clad socket outlet with backbox	1
20mm PVC conduit Tee Box	2
20mm PVC conduit Angle box	1
20mm PVC conduit End box	1
Batten lamp holder	2
20mm PVC conduit	3m
20mm Conduit saddles	6
2.5mm T&E PVC/PVC	3M
2.5 Clips	10
2.5mm 3core SWA	3M
20mm SWA Glands	2
SWA Cleats	8
PVC Conduit box lids	2

Note 1: The PVC conduit must bridge an obstruction (20mm PVC conduit) using a double set with a minimum clearance of 20mm and a maximum clearance of 30mm.



Note 2: 3 core flex and 13A plugtop to be supplied by college for connection to supply using trailing socket.

Example A



Key	
DB1	Metal Clad Consumer Unit
LT1	BC baton lamp holder
LT2	BC baton lamp holder
SW1	1 Gang 2 Way light switch
SW2	2 Gang 2 Way light switch
SO1	13A Single metal clad switched socket outlet
CU1	13A Switched fused connection unit

Marking Guide for Example A

Competitor name…… Date……

Aspect ID	Description	Maximum mark allocated	Mark awarded
A1	CU1 circuit completed in the correct cable as per the specification	**1**	
A2	SO1 circuit completed in the correct cable as per the specification	**1**	
A3	LT1 and LT2 circuit completed in the correct cable as per the specification	**1**	
A4	Conductors securely terminated at DB1 with no exposed copper when viewed at 90 degrees. Pull test on all terminations. No damage to insulation or reduction in conductor CSA (1 mark per circuit to include supply)	3	
A5	SWA gland terminated correctly (1 mark per gland)	2	
A6	Conductors securely terminated at CU1 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A7	Conductors securely terminated at SW1 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A8	Conductors securely terminated at SW2 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A9	Conductors securely terminated at SO1 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A10	Conductors securely terminated at LT1 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A11	Conductors securely terminated at LT2 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A12	CPCs and Neutral conductors connected in correct sequence at DB1 for all circuits (1 mark per circuit and 1 mark for Earthing conductor)	3	
	Total marks for A	**23**	

Aspect ID	Description	Maximum mark allocated	Mark awarded
B1	PVC conduit bridge set and offset acceptable as per specification and drawing	3	
B2	PVC conduit bend acceptable and inner radius at least 2.5 times outside diameter of the conduit	3	
B3	PVC/ PVC cable securely clipped horizontally and vertically. Bending radii satisfactory	3	
B4	SWA cable securely clipped horizontally and vertically. Bending radii satisfactory	3	
B5	Additional material used (-1 mark for each item issued)	0	
	Total marks for B	12	

Aspect ID	Description	Maximum mark allocated	Mark awarded
C1	DB1 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (500mm)	1	
C2	LT1 centred, horizontally and vertically within 2mm of measurements taken from datum lines (350mm & 1000mm)	1	
C3	LT2 centred horizontally and vertically within 2mm of measurements taken from datum lines (1000mm)	1	
C4	SW1 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (350mm and 300mm)	1	
C5	SW2 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (350mm and 300mm)	1	
C6	Centre of set within 2mm of measurements taken from datum (500mm)	1	
C7	SO1 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (350mm and 800mm)	1	
C8	CU1 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (300mm)	1	
C9	PVC/ PVC cable horizontal and vertically within 2mm of measurements taken from datum line (500mm)	1	
C10	SWA cable horizontal and vertically below datum lines within 2mm of measurements (1000mm)	1	
	Total marks for C	10	

Aspect ID	Description	Maximum mark allocated	Mark awarded
D1	Personal protective equipment used at all times	1	
D2	Work area kept free from hazards at all times	1	
D3	Safe working practices employed when using hand tools	1	
D4	No faults or dangers found when work tested	1	
D5	Due consideration to others safety demonstrated	1	
	Total marks for D	**5**	

Aspect ID	Description	Maximum mark allocated	Mark awarded
E1	Correctly carries out continuity testing on each circuit	3	
E2	Correctly carries out insulation resistance testing on each circuit	3	
E3	Correctly carries out polarity testing on each circuit	3	
E4	Correctly completes schedule of test results for each circuit	3	
	Total marks for E	**12**	

Aspect ID	Description	Maximum mark allocated	Mark awarded
F1	CU1 functions correctly	1	
F2	SO1 functions correctly	1	
F3	LT1 functions correctly	1	
F4	LT2 functions correctly	1	
	Total marks for F	**4**	

Total marks awarded for Example A	

Assessed by:

Name:…… Role:……

Example B

Circuit 1: 20A radial circuit feeding a switched fused connection unit (CU1) wired in PVC/ PVC insulated cable.

Circuit 2: 20A general power circuit feeding one single metal clad switch socket outlet (S01) wired in 3-core SWA cable.

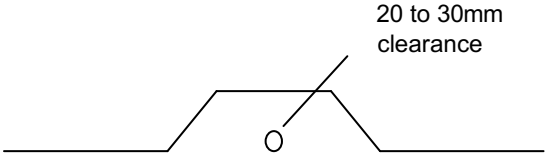
Circuit 3: 6A lighting circuit wired in a single PVC insulated cable enclosed in PVC conduit. The circuit consists of 2 lighting points. LT1 is controlled by two-way switching, SW1 and the left-handed side of SW2. LT2 is controlled by a one-way switch, right-hand side of the two-gang switch (SW2).

Materials list

Description	Quantity
Metal clad 4-way DB	1
6A MCB *or RCBO	1
16A MCB *or RCBO	2
MCB Blank	1
2 gang 2-way switch	1
2-way switch	1
Switch pattress PVC with 20mm knockout	2
13A fused connection unit	1
Pattress for above with 20mm knock out	1
Metal clad socket outlet with backbox	1
20mm PVC conduit tee box	2
20mm PVC conduit through box	1
20mm PVC conduit end box	1
Batten lamp holder	2
20mm PVC conduit	3 metres
20mm conduit saddles	6
2.5mm T&E PVC/ PVC	3 metres
2.5 clips	10
2.5mm 3core SWA	3.5 metres
20mm SWA glands	2
SWA cleats	8
PVC conduit box lids	2

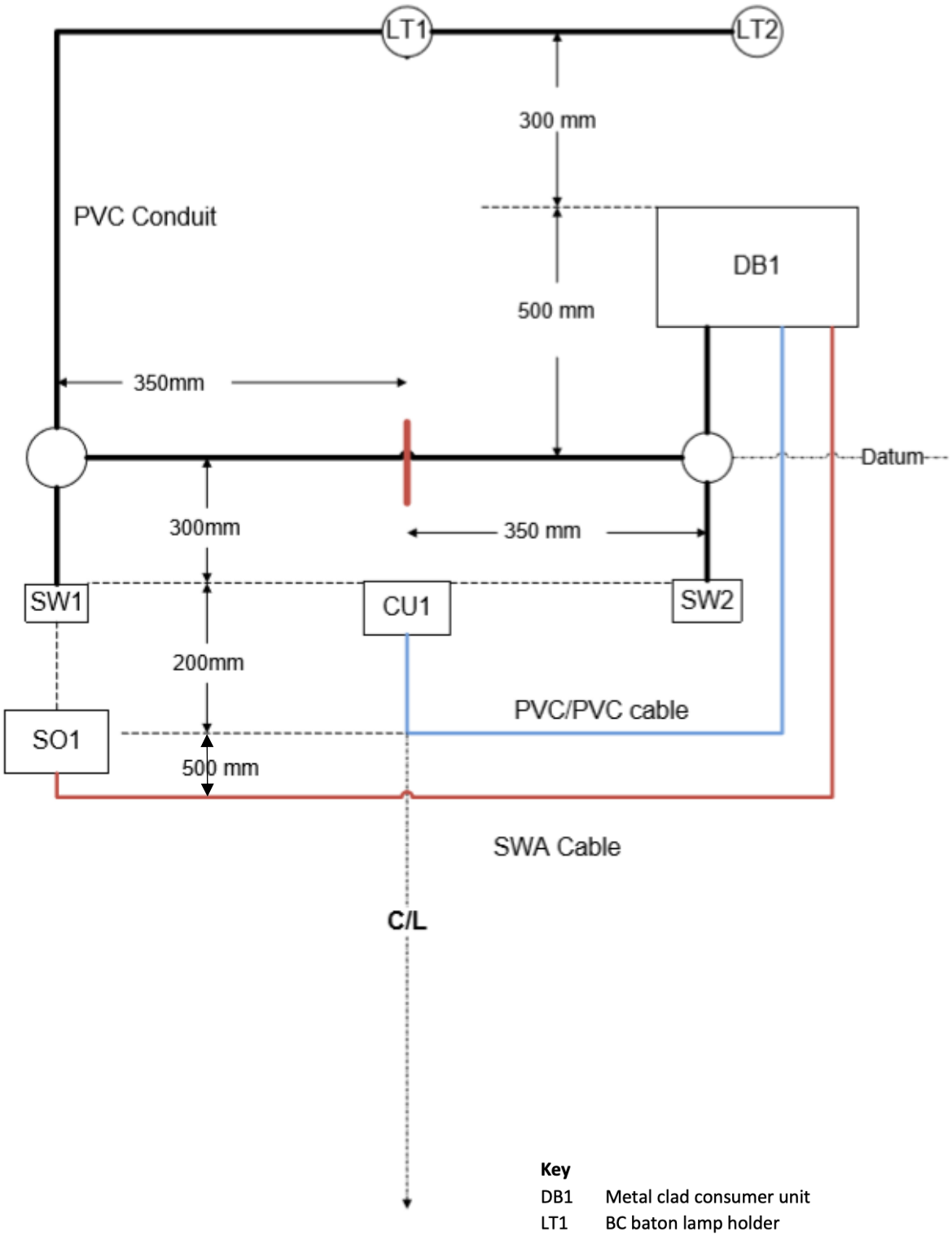
We suggest that you set a time limit by which to complete the task by which is a PVC conduit, PVC/ PVA and a SWA installation with the following 2 circuits.

Note 1: The PVC conduit must bridge an obstruction (20mm PVC conduit) using a double set with a minimum clearance of 20mm and a maximum clearance of 30mm.



Note 2: 3 core flex and 13A plug top to be supplied by organisation for connection to a RCD protected supply using trailing socket.

Example B



Key

DB1	Metal clad consumer unit
LT1	BC baton lamp holder
LT2	BC baton lamp holder
SW1	1 gang 2-way light switch
SW2	2 gang 2-way light switch
SO1	13A single metal clad switched socket outlet
CU1	13A switched fused connection unit

Marking Guide for Example B

Competitor name…… Date……

Aspect ID	Description	Maximum mark allocated	Mark awarded
A1	CU1 circuit completed in the correct cable as per the specification	1	
A2	SO1 circuit completed in the correct cable as per the specification	1	
A3	LT1 and LT2 circuit completed in the correct cable as per the specification	1	
A4	Conductors securely terminated at DB1 with no exposed copper when viewed at 90 degrees. Pull test on all terminations. No damage to insulation or reduction in conductor CSA (1 mark per circuit to include supply)	3	
A5	SWA gland terminated correctly (1 mark per gland)	2	
A6	Conductors securely terminated at CU1 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A7	Conductors securely terminated at SW1 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A8	Conductors securely terminated at SW2 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A9	Conductors securely terminated at SO1 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A10	Conductors securely terminated at LT1 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A11	Conductors securely terminated at LT2 with no exposed copper when viewed at 90 degrees. No damage to insulation or reduction in conductor CSA. Pull test on all terminations	2	
A12	CPCs and Neutral conductors connected in correct sequence at DB1 for all circuits (1 mark per circuit and 1 mark for Earthing conductor)	3	
	Total marks for A	**23**	

Aspect ID	Description	Maximum mark allocated	Mark awarded
B1	PVC conduit bridge set and offset acceptable as per specification and drawing	3	
B2	PVC conduit bend acceptable and inner radius at least 2.5 times outside diameter of the conduit	3	
B3	PVC/ PVC cable securely clipped horizontally and vertically. Bending radii satisfactory	3	
B4	SWA cable securely clipped horizontally and vertically. Bending radii satisfactory	3	
B5	Additional material used (-1 mark for each item issued)	0	
	Total marks for B	12	

Aspect ID	Description	Maximum mark allocated	Mark awarded
C1	DB1 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (500mm)	1	
C2	LT1 centred, horizontally and vertically within 2mm of measurements taken from datum lines (CL and 800mm)	1	
C3	LT2 centred horizontally and vertically within 2mm of measurements taken from datum lines (1000mm)	1	
C4	SW1 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (350mm and 300mm)	1	
C5	SW2 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (350mm and 300mm)	1	
C6	Centre of set within 2mm of measurements taken from datum (500mm)	1	
C7	SO1 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (350mm and 500mm)	1	
C8	CU1 level, centred horizontally and vertically within 2mm of measurements taken from datum lines (300mm)	1	
C9	PVC/ PVC cable horizontal and vertically within 2mm of measurements taken from datum line (500mm)	1	
C10	SWA cable horizontal and vertically below datum lines within 2mm of measurements (1000mm)	1	
	Total marks for C	10	

Aspect ID	Description	Maximum mark allocated	Mark awarded
D1	Personal protective equipment used at all times	1	
D2	Work area kept free from hazards at all times	1	
D3	Safe working practices employed when using hand tools	1	
D4	No faults or dangers found when work tested	1	
D5	Due consideration to others safety demonstrated	1	
	Total marks for D	**5**	

Aspect ID	Description	Maximum mark allocated	Mark awarded
E1	Correctly carries out continuity testing on each circuit	3	
E2	Correctly carries out insulation resistance testing on each circuit	3	
E3	Correctly carries out polarity testing on each circuit	3	
E4	Correctly completes schedule of test results for each circuit	3	
	Total marks for E	**12**	

Aspect ID	Description	Maximum mark allocated	Mark awarded
F1	CU1 functions correctly	1	
F2	SO1 functions correctly	1	
F3	LT1 functions correctly	1	
F4	LT2 functions correctly	1	
	Total marks for F	**4**	

Total marks awarded for Example B	

Assessed by:

Name:…… Role:……