Progression in Building Services Engineering (Level 2)

Practical Project Pack A

Version 2 – March 2023

Contents

Version information

Version and publication date	Changes
v1 Sept 2021	Original document
V1.1 Sept 2022	Electrical assessment: MI Cable replaced with alternate cable, and minor updates to drawings/task
V2 March 2023	Additional advice given on the Plumbing assessment

1. Introduction for assessors

This pack contains the project brief and practical tasks for supporting Planning tasks and the Performing section of the project.

Assessors must provide candidates with the relevant project briefs and planning tasks for the learners chosen trade area at the start of the project assessment.

Learners must adhere to all relevant health and safety rules and procedures at all times.

2. Project guidance, tasks and grading

The following Planning and Evaluation guidance and tasks apply to all trades within this qualification, these must be paired with the relevant trade brief to structure and support assessment.

Learner guidance

This project has three elements: planning, performing, and evaluating.

You have:

- **14 hours** allocated for the planning of all three tasks (planning)
- **40 hours** allocated to carry out the three tasks (performing)
- **6 hours** to evaluate the three tasks in the project (evaluating).

You may not use the time you have been given for each element for another element, i.e. If you complete your planning in 12 hours you may not use the other two hours for either the performing or the evaluating.

You will be required to devise plans for all 3 tasks showing the approach you will take to undertake the work required in the tasks, underpinned by an overall schedule of works.

Once the task has been completed you will be required to evaluate your work.

You must adhere to all relevant health and safety procedures at all times.

Planning task

This will be undertaken in a classroom environment where you will have access to IT equipment and appropriate resources to carry out your research. These materials may include guidance notes, regulations, and manufacturers' instructions/literature.

You will be required to produce the following:

- a resource list including tools, materials and equipment needed to complete each task (refer to the task specifications provided)
- a risk assessment
- a method statement including a schedule of works (with timelines) - your plan must indicate how long you estimate you will take on each task, identifying the key activities/phases of work within each task and how long you expect these to take, any potential dependencies between activities/phases of work, any milestones you wish to achieve – for example the main activities in tasks
- drawings/diagrams (if indicated in the task specification)
- a customer estimate for each task (see the project costs information provided below)
- a set of success criteria that you have set yourself for the performance tasks. Your success criteria can relate to whatever you think is appropriate for the work, for example the quality of the installation/finish, ways of working (e.g. measuring and marking out, drilling, fixing, bending, fabricating, clipping etc.). Think about why you have set the success criteria and how these will support a quality output.

Think about:

> **'What does a good build/installation look like in my trade area? How can I achieve this?'**

Your learning provider will provide proformas to support your responses to this task.

You must include this information above in your plans.

Project costs task

For this element you are required to produce an estimate for a customer for **each of the tasks within the trade brief provided by your assessor.**

You are self-employed and work alone; your overheads include insurances, van running costs, and admin costs that total £6.25 per working hour, your hourly rate is £25 per hour, and your business operates on a 25% profit margin.

Use the resource list and the timelines from the schedule of works you have produced to produce an estimate for a customer.

This estimate must include:

- an overview of the work to be undertaken
- the overall price to the customer for the task – including how this was determined (please show working)
- the duration of the task
- a resource list with costs

You will complete plans for all 3 tasks within the Practical Project, all 3 must meet the threshold pass mark for the planning element before moving on to the performing element of the Practical Project.

Two copies of each plan are required; one must be submitted to your assessor and one copy kept for use in the performing element of the project.

Performing task

Requirements for the performing element of each Practical Project can be found in the section 3 of this document which contains project briefs for each trade.

Evaluating

Upon completion of the performance element you are required to write **one** evaluation report which reflects **all tasks** undertaken as part of the project. Within this report you must evaluate the approaches taken towards completing the tasks and the quality of the outcomes, comparing the project outcomes with the task requirements and your plan including the success criteria you have previously set.

You will undertake this evaluation in a classroom environment.

When completing your project evaluation you will have access to your planning documentation to support this activity.

Your evaluation must answer the following:

- Did you meet the requirements of your plan?
- Did you meet your success criteria?
- Did you meet the requirements for all tasks?

Also consider as relevant:

- What went well? What were your strengths?
- What did not go well? Did you have any areas of improvement?
- What would you do differently if you were to complete the task(s) again? Would you use a different approach next time?
- How well did you plan? Should you have done more?
- What problems did you encounter? How did you overcome them?
- Did the practical tasks go to plan? (e.g. resources, time)
- If you carried out testing/commissioning what did your results mean?
- What did you learn from the project?

Presentation of work

Written responses are required for the tasks within the planning and evaluation section of the project.
Written responses must be provided as electronic, typed responses. You must ensure that your work is presentable, i.e. use a standard font in a readable size (for example Times New Roman, or equivalent, size 12), use double spacing and include adequate margins.

You must make sure that each piece of work is clearly labelled with your name, centre number, learner number and the assignment reference.
All electronic files must be saved in the following format: SURNAME_FIRST NAME_NAME OF ASSESSMENT_DATE _VERSION NUMBER

Assessor guidance

Planning task

The learner will need to devise a plan for each of the tasks within their chosen trade's project brief.

Learners must complete their planning within a classroom environment monitored by centre staff who have undergone invigilation training. Learners must have access to IT facilities with access to the internet, manufacturers' information, wholesalers' catalogues, HSE guidance notes and any other material that would be available to them as if this project was to be carried out in the workplace.

No set recording forms have been provided for written documentation such as risk assessments or method statements. Centres must provide proformas to learners for the planning element of the project.

Once the learner has completed the planning task a copy of their plan must be submitted to the assessor for assessment purposes and a copy retained by the learner to be used in the performing element of the project. As per the guidance provided to learners, this must be provided as an electronic copy.

To support ongoing assessment, the assessor must mark the planning element and **confirm that a minimum threshold for a pass has been achieved in all 3 task plans before the learner may progress to the performing element of the Practical Project**. This ensures that learners only progress when they have identified sufficient health and safety requirements, as well as the necessary materials and equipment for the tasks.

Only the mark from the highest scoring plan will contribute to the overall project mark.

Assessment decisions and confirmation of next steps must be provided to the learner within one week of completion of the planning element.

In order to support the manageability of the practical tasks, a tools and materials list has been provided as part of the project brief for each trade. **Please note that these lists are for centre-use only and must not be provided to learners** – learners must use their own developed material and equipment list from their planning.

Learners will be required to produce the following:

- a resource list including tools, materials and equipment needed to complete each task (refer to the task specifications provided) **(marking grid reference a)**
- a risk assessment **(marking grid reference b)**
- a method statement including a schedule of works (with timelines) identifying the key activities/phases of work within each task and how long learners expect these to take, any potential dependencies between activities/phases of work, any milestones they wish to achieve – for example the main activities in tasks **(marking grid reference b & d)**

- drawings/diagrams (if indicated in the task specification) **(marking grid reference b)**
- a customer estimate for each task (see the project costs information provided below) **(marking grid reference c)**
- success criteria for each task. This can relate to whatever they think is appropriate for the tasks, for example the quality of the installation, ways of working (e.g. measuring and marking out, drilling, fixing, bending, fabricating, clipping etc.). Learners should be able to justify why they have set the success criteria they have and how they support quality outputs/outcomes. **(marking grid reference e).**

Project cost task

This element of the assessment requires the learner to develop an estimate for the customer **for each of the tasks from the trade brief of their chosen trade.** The project brief for the chosen trade must be provided to the learner before they begin this assessment.

The learner will complete the following task:
You are self-employed and work alone; your overheads include insurances, van running costs, and admin costs that total £6.25 per working hour, your hourly rate is £25 per hour, and your business operates on a 25% profit margin.

Use the resource list and the timelines from the schedule of works you have produced for one of the tasks to produce an estimate for a customer for the chosen task.

This estimate must include:

- an overview of the work to be undertaken
- an overall price for the customer for the task – including how this was determined (please show working)
- the duration of the task
- a resource list with costs.

They have **14 hours** to complete the planning element. If they complete in less time, they cannot use the extra time in the other elements of this project or take time from other elements to add time here.

Performing task

Requirements for the performing element of each Practical Project can be found in the section 3 of this document which contains project briefs for each trade.

They have **40 hours** to complete the performing element. If they complete in less time, they cannot use the extra time in the other elements of this project or take time from other elements to add time here.

Evaluation

Once learners have completed the performing element of the project, they must produce **one** evaluation report which reflects on the whole project and includes all tasks. Within this report learners must evaluate the approaches they took towards completing the tasks and the quality of the outcomes, comparing the results/outcomes of their project with the task requirements and their plan including the success criteria set.

This will be undertaken in a classroom environment under supervision from centre staff, ensuring learners have access to their planning documentation to support their review and evaluation activity.

They will have **6 hours** to complete this element.

Marking and grading

Using the grading grid

For the **planning element** of the project, assessors must use the planning marking grid within each trade brief to award a mark of 1-3 for elements a – e, based on the performance level of the learner. If the learner fails to meet the marking criteria for a particular element a score of 0 must be awarded. Learners will plan the practical element for **all 3 tasks**, in line with marking criteria a - e. However, whilst all task plans will be required to be marked by the assessor, **it will only be the marks from the learners highest scoring task plan that will contribute towards the final assessment mark**.

For the **practical ('performing') element**, assessors must use the project brief and marking grid for the relevant trade to determine the provisional grade achieved, these can be found in the Trade Project Briefs section below.

For the **evaluation element**, assessors must use the evaluation section of the marking grid below to award a mark of 1-3 for elements a and b based on the level of performance demonstrated by the learner. If the learner fails to meet the marking criteria for a particular element a score of 0 must be awarded.

Please note that scaling factors are applied to the planning and evaluating elements of this assessment, these include multiplying the score achieved by the number indicated in the marking grid below. These must be applied once marks have been awarded for each criterion within the relevant elements.

3. Trade project briefs

3.1 Plumbing and heating assessment brief

A customer is having various works carried out on their property. This includes a single-storey extension on the rear of a detached residential two-storey dwelling and repurposing two existing garden buildings into a garden office and a workshop.

Your firm has been contracted to install a downstairs cloakroom within the extension, incorporating a toilet and wash hand basin, in an adjacent cupboard a new hot water cylinder and the boiler relocated with a radiator fitting in the new cloakroom.

This project has three elements: planning, performing, and evaluating.

You have:

- **14 hours** allocated for the planning of all three tasks (planning)
- **40 hours** allocated to carry out the three tasks (performing)
- **6 hours** to evaluate the three tasks in the project (evaluating).

You may not use the time you have been given for each element for another element, i.e. If you complete your planning in 12 hours you may not use the other two hours for either the performing or the evaluating.

You will be required to devise a plan showing the approach you will take to undertake the work required in the performance tasks, underpinned by an overall schedule of works.

Once the installation has been completed you will be required to evaluate your work.

You must adhere to all relevant health and safety rules and procedures at all times.

Central heating and cylinder integration note

The connections from the system boiler jig and the cylinder installation are based on a Worcester Bosch System Boiler* using an internal diverter valve kit, removing the need of the 2-port motorised valve to cut the flow of heat to the cylinder to comply with Building Regulation Part G3.

These elements are only to test pipework skills, appliance connection requirements and an ability to follow plans.

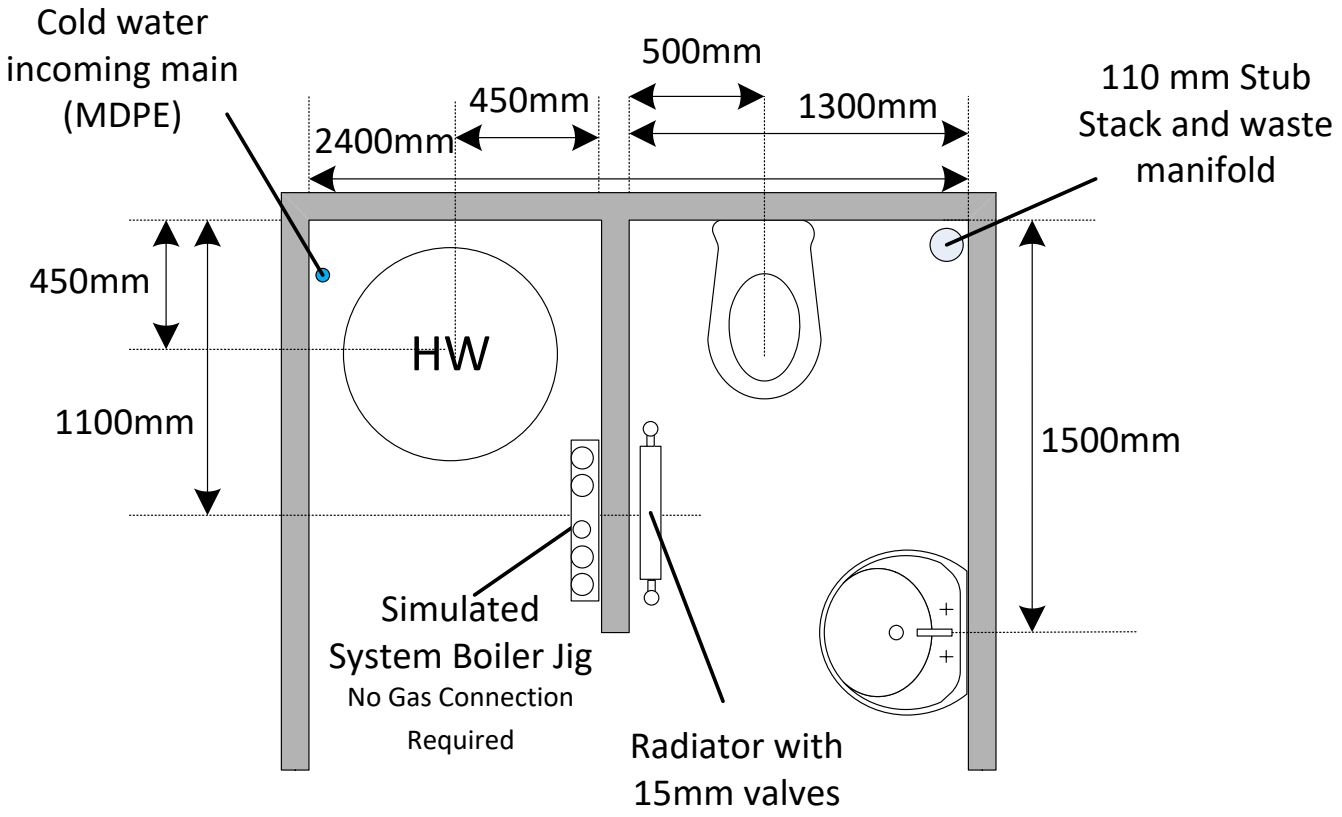
The central heating and cylinder pipework, controls and component integration can be more complex than the diagram indicates, and these will be taught in more detail at Level 3.

Important note

This pipework plan is **not** to be used to install a fully functioning unvented hot water cylinder or any other appliance, additional competencies will be required, and Manufacturer's instructions and British Standards must be referred to and used.

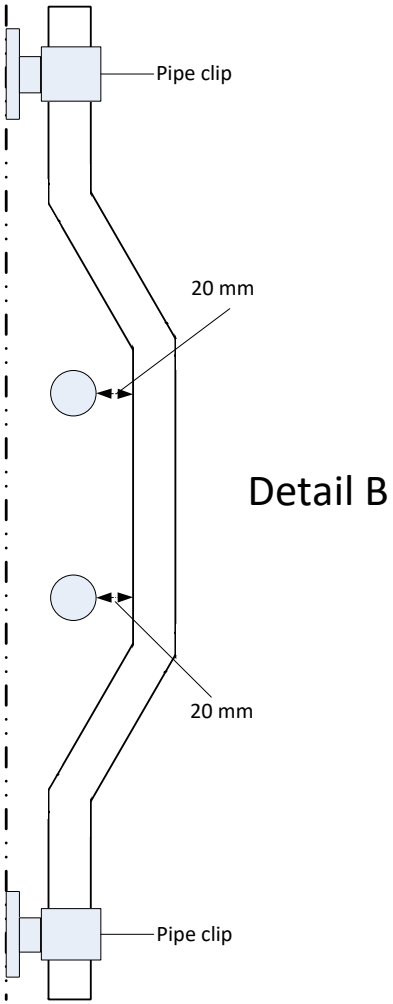
*An example of this pipework configuration can be found in the Worcester Bosch Greenstar 8000 Style System Boiler Installation and Maintenance Instructions, which are readily available via the Worcester Bosch website.

Overall project plan



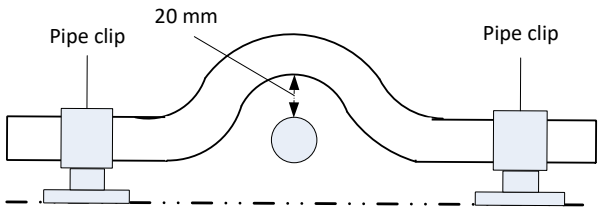
Bay needs to be set out to simulate both a cloakroom and cylinder cupboard

Project detail information



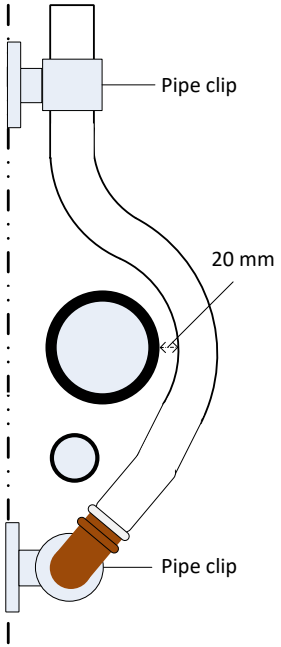
Detail B

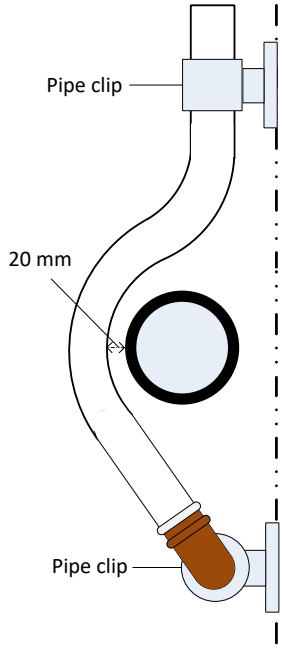
Detail A



Important note:
Diagram is not to scale
Pipe clips are to be located as required

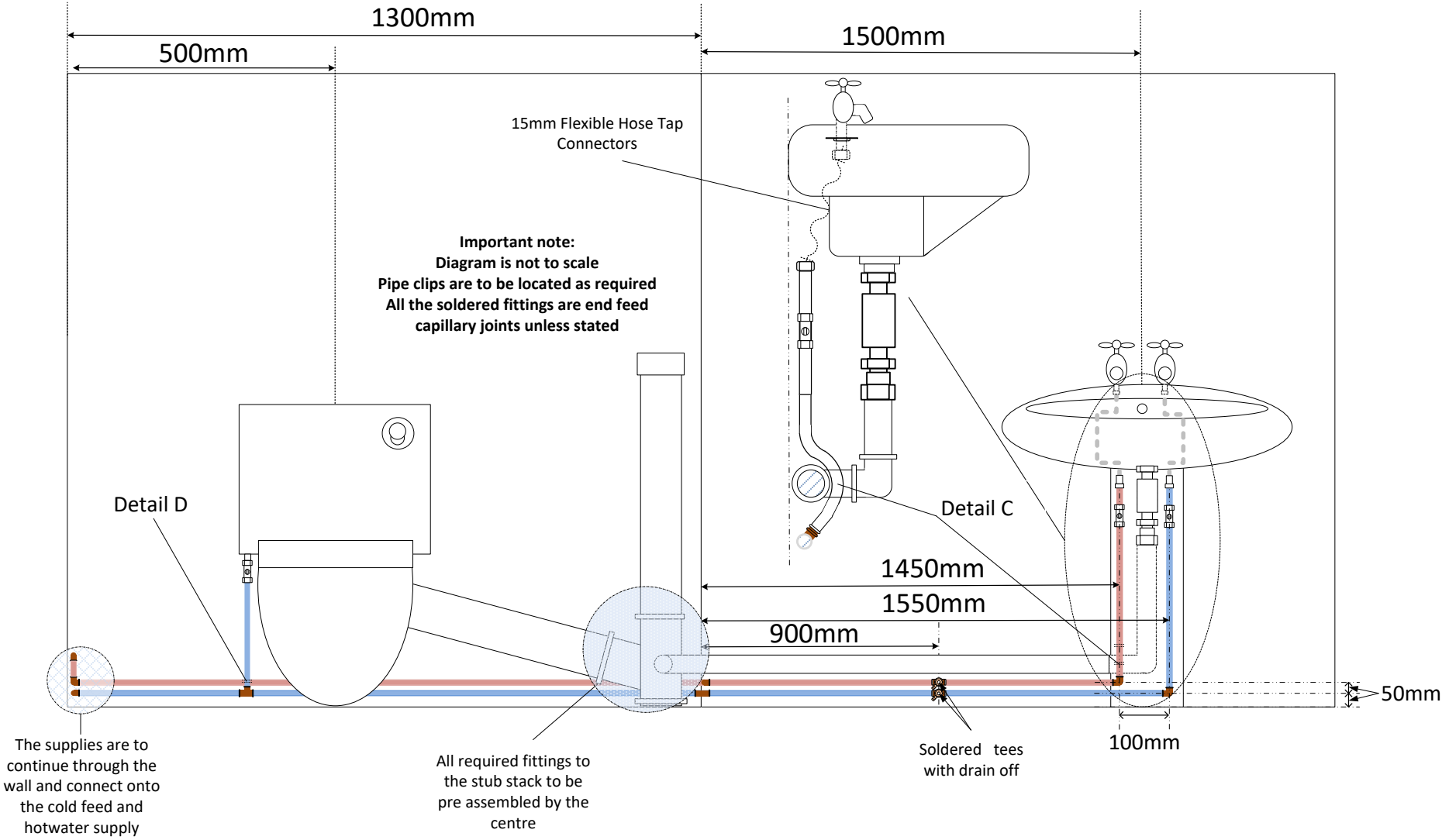
Detail C





Detail D

Task 1 Specification: Wash hand basin and toilet



Assessor task 1 guidance

Centre information

This must be completed on a ‘live’ installation for hot, cold water and sanitation system, to be eventually secured and fixed to a suitable surface.

Centres to provide a workshop space that realistically represents a domestic cloakroom with a stub stack in the right hand rear corner and a cylinder cupboard.

Centres to provide a cloakroom suite (comprising of a wash hand basin and toilet).

Centres to provide materials and fittings to complete the assessment (the learner will determine the materials and fittings to be used as part of the assessment).

Installation requirements

- Refer to Task 1 plan for information
- Centres to determine pipework configurations based on the dimensions provided in Task 1 plan

Sanitation

- Provision to be made for a connection to drain

Commission and test sanitation system.

If it is not feasible to assess testing on the completed bay installation, centres should devise their own test rig to include waste connections for the toilet, and wash hand basin. The configuration of this test rig must be confirmed with EAL.

Resource List

Task 1	Quantity
Close coupled toilet	1
90^0 Bent pan connector	1
soil pipe	800mm
1/2" x 15mm service mains valve (tap connector)	1
Wash Hand Basin	1
1/2" basin taps	2
Basin waste	1
Straight through basin trap	1
32mm (1 1/4") waste pipe	2m
32mm (1 1/4") elbow	2
32mm (1 1/4") Male & Female elbow	1
1/2" x 15mm comp flexible tap connectors	2
15mm end feed elbow	6
15mm end feed tee	3
15mm soldered drain off	2
15mm compression inline service valve	2
15mm Cu pipe	7m

Sundries

Flux, solder, cleaning pads

Plugs, screws and clips to support pipework (copper tube and waste pipe) and appliances

Jointing compound, PTFE

Connections for the final soil pipe to be determined by the centre to fit in with their pre-plumbed stub stack

Tools and equipment:

- Selection of appropriate plumber's hand tools
- Hacksaw
- Pipe cutters 15/22mm
- Pipe bender 15/22 mm
- Blow lamp
- Drill and bits.

Learner task 1 guidance

You will:

Install all the systems and relevant components, ensuring that:

- All incoming supplies are adequate for the new installations
- All sanitary appliances to have waste and terminal fittings assembled prior to fixing
- Sanitary appliance installation to conform with industry standards and manufacturers installation instructions
- All pipework installation to conform to centre specification and comply with regulations, industry standards (i.e. tolerances + or – 2mm) and codes of practice
- All pipework to be clipped to BS specification
- All pipework to be insulated to BS specification, as appropriate
- All components and pipework systems cannot be brought into operation before the work has been fully complete

Cold water:

- Incoming cold water service pipe in MDPE connected to copper using compression fitting
- All cold water supply pipework in copper using a range of capillary and compression fittings, couplings, bends, elbows and tees
- The cold feed will be connected to the mains via the balancing valve as part of task 2
- System pipework tested to BSEN 806.

Hot water:

- All hot water supply pipework to sanitary appliances in copper using a range of capillary and compression fittings, couplings, bends elbows and tees.
- The hot water system will be connected to the cylinder as part of task 2
- System pipework tested to BSEN 806.

Sanitation:

- All pipework in plastic using a range of fittings to include ring seal joints, solvent welded joints, compression joints (traps) and a pan connector to the toilet
- All waste pipework connections to stub stack made through manifold

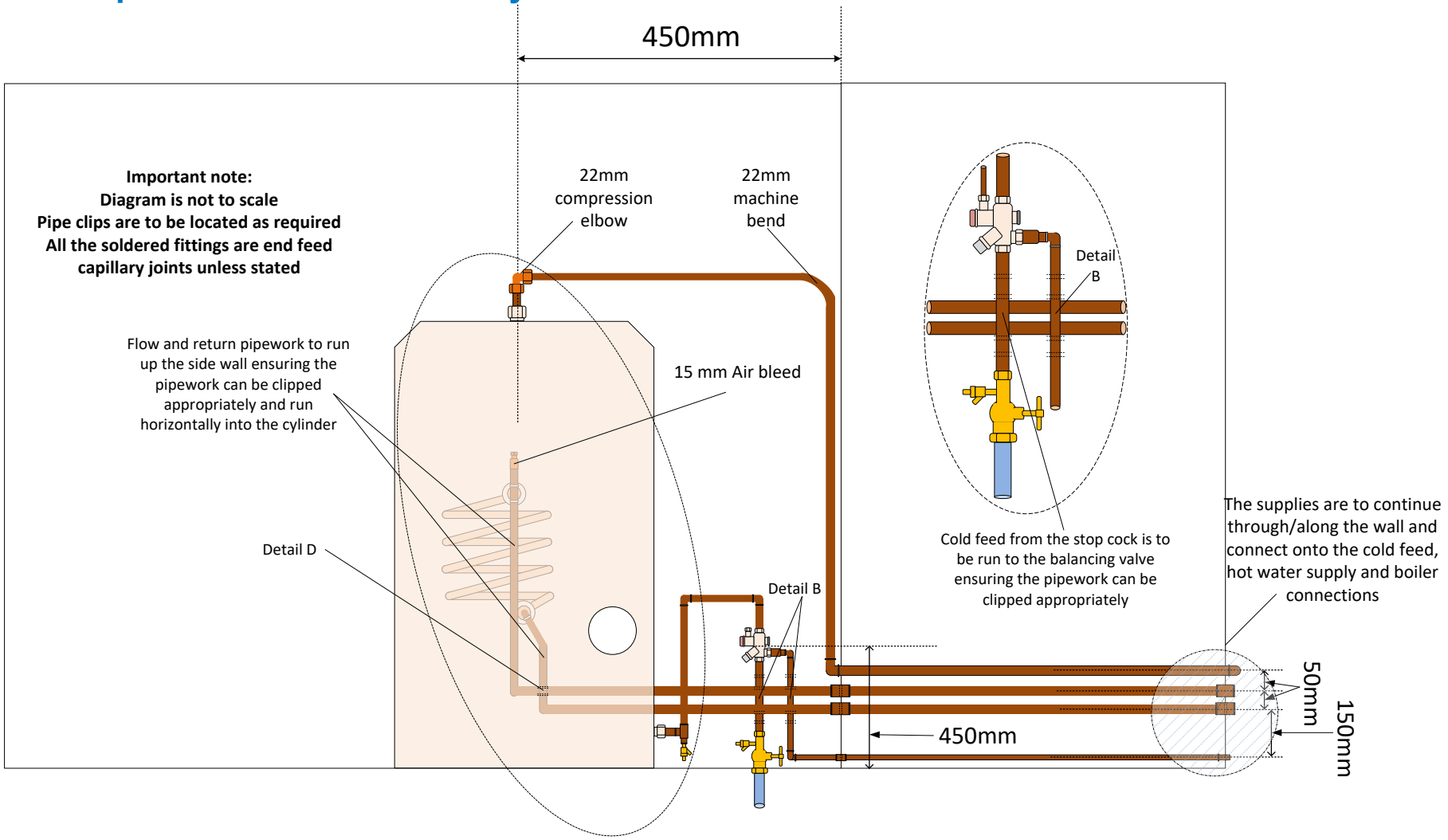
Testing the systems:

- Inspect the systems after installation ensuring they meet all the relevant industry standards and soundness test all *system types as per the relevant industry standard.

*Hot and cold systems will be formally tested when all the relevant tasks have been completed.

You must always work safely when carrying out this task.

Task 2 Specification: Hot water cylinder



Assessor task 2 guidance

Centre information

Before this element of the assessment is undertaken the assessor must explain to the learner what the assessment is covering and explain that if this was a live installation the Manufacturer's instructions and British Standards must be followed and there may be a requirement for further controls, components, and pipework layout depending on the Manufacturer, and that these elements will be covered at Level 3.

Centres to determine pipework configurations based on the specifications provided in the Task 2 plan.

Hot water storage vessel and relevant controls to comply with industry standards, capacities appropriate to the drawing dimensions and have the safety controls/components pre plumbed, the learner is only to connect the cold feed, hot supply and flow and return from the system boiler jig.

Manufacturer's fixing and installation procedures and specifications are fully met.

Appropriate British Standards, Building Regulations G3 and Water Regulations are complied with.

Health and safety relevant to the assessment is supervised at all times.

Ensure all work carried out conforms to:

Building Regulations G3, Water Regulations and appropriate British Standards, Manufacturer's instructions.

Important note

The installation **must not** have a heat source added to heat the stored hot water.

Resource list

Task 2	Quantity
Unvented indirect cylinder	1
Cold water balancing valve - complete	1
straight 22mm cylinder connections	4
22mm compression elbow	1
15mm end feed drain off	1
15mm air bleed	1
22mm end feed equal tee	2
22mm end feed elbow	7
22mm x 15mm reducer	2
15mm end feed elbow	2
15mm end feed equal tee	1
15mm Cu pipe	3m
22mm Cu pipe	7m

Sundries

Flux, solder, cleaning pads

Plugs, screws and clips to support pipework (copper tube and waste pipe) and appliances

Jointing compound, PTFE

Tools and equipment:

- Selection of appropriate plumber's hand tools
- Hacksaw
- Pipe cutters 15/22mm
- Pipe bender 15/22 mm
- Blow lamp
- Drill and bits

Learner task 2 guidance

You will:

Check and confirm the safety of the work location/immediate work area.

Select appropriate tools, materials, components and fixings to carry out the installation as per the unvented hot water system and components task 2 template supplied by the assessor.

Carry out the unvented hot water installation job as per the unvented hot water system and components task 2 template supplied by the assessor to include:

Installation pre checks:

- Unvented cylinder is of an approved type and is in good condition
- Installed pipework meets the statutory requirements
- Pipework components fitted are in good condition and suitable for the cylinder and system to which they are being installed

Install the unvented hot water system and inspect the installation for compliance and confirm:

- The cold feed is supplied via a balancing valve and the balancing valve is installed in the correct position
- The cylinder is installed in the correct position, is adequately supported level and plumb
- The correct identity of all the installation supply pipework and its purpose
- All pipework installation to conform to centre specification and comply with regulations, industry standards (i.e., tolerances + or – 2mm) and codes of practice
- All pipework to be clipped to BS specification
- All pipework to be insulated to BS specification, as appropriate
- All components and pipework systems cannot be brought into operation before the work has been fully complete

Testing the systems:

- Inspect the systems after installation ensuring they meet all the relevant industry standards and soundness test all *system types as per the relevant industry standard
- System pipework tested to BSEN 806

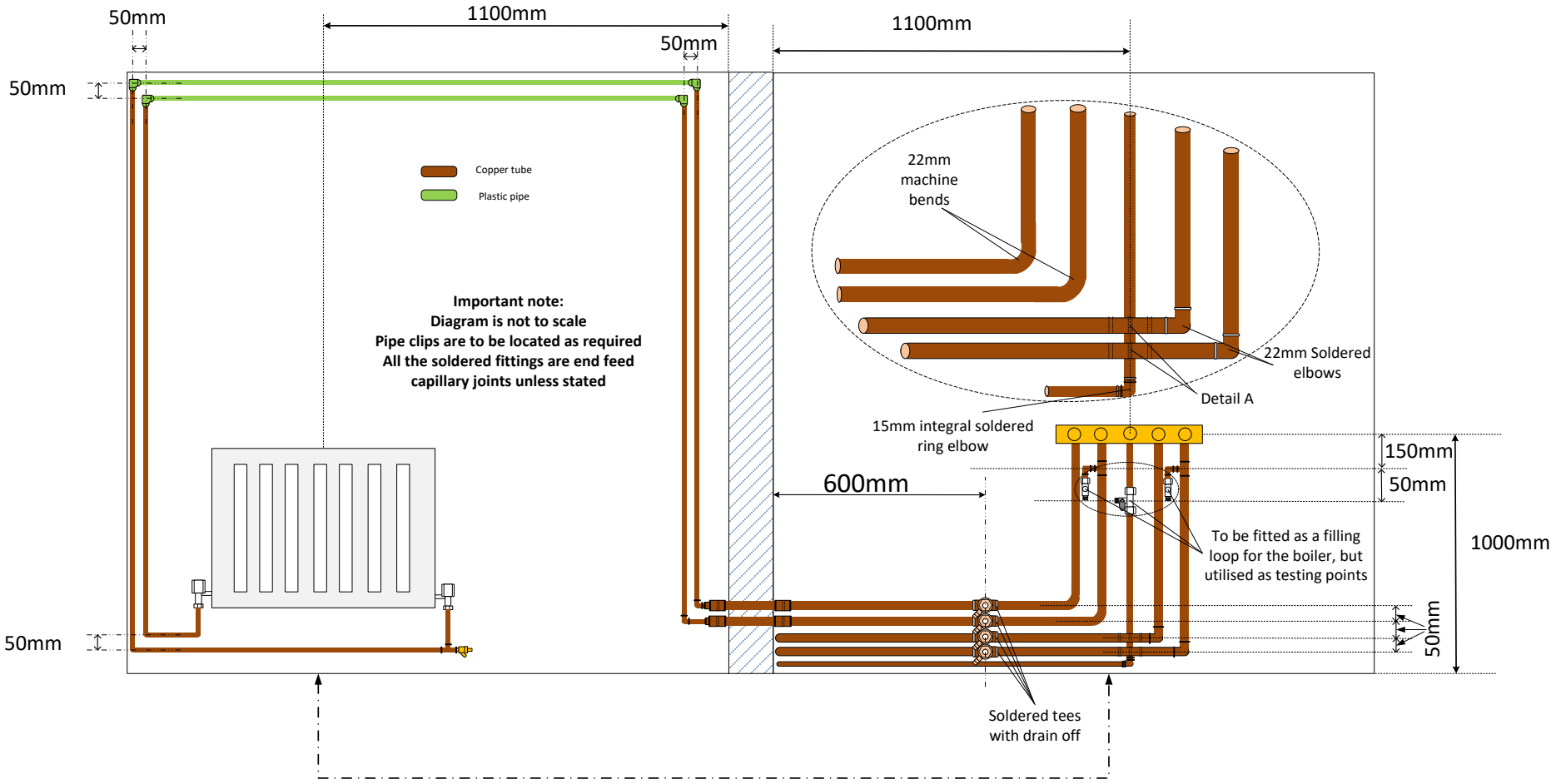
*Hot and cold systems will be formally tested when all the relevant tasks have been completed.

Ensure all work carried out conforms to:

Building Regulations G3, Water Regulations and appropriate British Standards, Manufacturer's instructions.

You must always work safely when carrying out this task.

Task 3 Specification: Central heating



Assessor task 3 guidance

Centre Information

Before this element of the assessment is undertaken the assessor must explain to the learner what the assessment is covering and explain that if this was a live installation the Manufacturer's instructions and British Standards must be followed and there may be a requirement for further controls, components, and pipework layout depending on the Manufacturer, and that these elements will be covered at Level 3.

Centres to determine pipework configurations based on the specifications provided in Task 3 plan.

Manufacturer's fixing and installation procedures and specifications are fully met.

Appropriate British Standards, Building Regulations and Water Regulations are complied with.

Task 3 should be used in conjunction with hot water rig for the cylinder connection Task 2.

Health and safety relevant to the assessment is supervised at all times.

Ensure all work carried out conforms to:

Building Regulations, Water Regulations and appropriate British Standards, Manufacturer's instructions.

Important note

The installation **must not** have a heat source added to heat the stored hot water.

Resource list

Task 3	Quantity
Boiler jig - this can be representative of what a manufacture would supply	1
filling loop	1
1/2" drain off	4
22mm tee with 1/2" on the branch tee	4
15mm compression inline service valve	3
22mm with 15mm on the branch end feed tee	2
22mm end feed elbow	6
15mm integral soldered ring elbow	1
15mm end feed elbow	7
15mm end feed tee	2
15mm soldered drain off	1
15mm push fit elbows	4
15mm inserts	4
Radiator (approximately 600mm x 600mm single)	1
15mm radiator valve	2
15mm plastic pipe	4m
15mm Cu pipe	14m
22mm Cu pipe	9m

Sundries

Flux, solder, cleaning pads

Plugs, screws and clips to support pipework (copper tube and plastic pipe) and appliances

Jointing compound, PTFE

Tools and equipment:

- Selection of appropriate plumber's hand tools
- Hacksaw
- Pipe cutters 15/22mm
- Pipe bender 15/22 mm
- Blow lamp
- Drill and bits

Learner task 3 guidance

You will:

Check and confirm the safety of the work location/immediate work area.

Select appropriate tools, materials, components and fixings to carry out the installation as per the Central Heating Installation template supplied by the assessor.

Carry out the central heating installation job as per the Central Heating Installation template supplied by the assessor to include:

Installation pre checks:

- Central heating components are of an approved type and in good condition
- Installed pipework meets the statutory requirements
- Pipework components fitted are in good condition and suitable for the cylinder and system to which they are being installed

Install the central heating system to:

- Boiler jig
- Panel radiator
- Connections to a hot water cylinder

Inspect the installation for compliance and confirm the:

- Components are installed in the correct position, are adequately supported level and plumb
- Correct identity of all the installation supply pipework and its purpose

Testing the systems:

- Inspect the systems after installation ensuring it meets all the relevant industry standards
- System pipework tested to BSEN 806

Ensure all work carried out conforms to:

Building Regulations, Water Regulations and appropriate British Standards, Manufacturer's instructions.

You must always work safely when carrying out this task.

Marking grids

Using the marking descriptors provided below for each assessment element, please indicate the marks awarded for each element. If the learner does not achieve the descriptors listed against an individual element (a, b, c, etc) a score of 0 must be awarded for that element. Marks must then be totalled for each section (including the use of any scaling factors, shown in the tables below) to create an overall mark for the project.

Planning marking grid

Learner name:	
Assessment date:	

a) Identify resource requirements to meet the task	**Mark achieved**
• produces a **coherent resource list** identifying the key basic tools and materials required to complete the main project aspects.	**1**
or	
• produces **a thorough quantified resource list** including relevant tools and materials required to complete the task (some items may be omitted in the list).	**2**
or	
• produces a **full and complete quantified resources list** with materials, tools, and any relevant equipment and sundries listed.	**3**
b) Plan the activities and the ordering/phasing of work to complete the task	**Mark achieved**
• produces a **coherent** method statement and risk assessment **with an estimated completion date**.	**1**
or	
• **correctly interpret diagrams** provided to produce a **coherent and considered** method statement and risk assessment with **milestones identified**.	**2**
or	
• **correctly interpret diagrams** to produce a **comprehensive** method statement and risk assessment with **detailed**, **considered milestones** as relevant to the task.	**3**

c) The main techniques used for estimating jobs/projects in building services	Mark achieved
• produces an estimate which includes an **overview of work to be undertaken**, an **accurate duration and overall price** to the customer	**1**
or	
• produces an estimate which includes an **overview of work to be undertaken**, an **accurate duration and overall price** to the customer which shows **how total cost and profit margin were used to determine this**	**2**
or	
• produces an estimate which includes a **clear overview of work to be undertaken**, an **accurate duration and overall price** to the customer which **shows a detailed breakdown of all costs used to determine thi**s	**3**
d) How to estimate time requirements	**Mark achieved**
• produces a method statement, including a schedule of works, that identifies the **key basic activities and overall task timings** on the project	**1**
or	
• produces a method statement, including a schedule of works, that identifies the **main tasks and activities** and **estimates time requirements** for these	**2**
or	
• produces a method statement, including a schedule of works, that includes **realistic estimates** for time requirements of key activities within tasks and for overall project, and identifies relevant **dependencies** between activities and tasks	**3**
e) Identify success criteria for the task	**Mark achieved**
• sets **coherent** success criteria in their plan • states key success criteria for the project task	**1**
or	
• sets **coherent and considered** success criteria in their plan • describes their relevance to the main aspects of the task	**2**
or	
• sets **comprehensive** success criteria in their plan • justifies why those success criteria have been chosen and relates them to the task	**3**
Mark achieved	/15
Total = Mark achieved × 6	**/90**

Only the mark from the highest scoring plan will contribute to the overall project mark.

Marks within the planning section of the Practical Project, are to be multiplied by 6 to create the total marks for this section of the project.

Performance marking grid

Task 1 - Wash hand basin and toilet Section A Measurement and marking out				
		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained the measurement from the centre of the toilet cistern to the left hand wall (500mm)	**A1**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the hot feed to the basin to the left hand wall (1450mm)	**A2**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the cold feed to the basin to the left hand wall (1550mm)	**A3**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the centre of drain off to the left hand wall (900mm)	**A4**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the hot and cold vertical supplies to the Basin centres (100mm)	**A5**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the hot and cold horizontal supplies to the left hand wall (50mm)	**A6**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm

Section B Health and Safety

Key points

- PPE must be worn as per centre's own risk assessment
- Tidy work area.

If there is a minor infringement, deduct marks as listed.

No minor infringement (3 marks), 1-2 minor infringements (2 marks), 3 minor infringements (1 mark), 4+ minor infringements and assessment is stopped, and the learner is referred.

The assessment must be stopped immediately if there is a major infringement of health and safety, which would also be classed as a fail.

		Marks

The learner has		1	2	3
Kept a clean and tidy work area		☐ 3	☐ 1-2	☐ None
Worn PPE as required		☐ 3	☐ 1-2	☐ None

Warnings should be issued where learners are working unsafely and putting themselves and/or others at risk.

Assessor to record infringement(s):

Section C Bends, angles and clearances

This section is only a visual inspection

- Bend quality look for no ripples or bends being pulled.

It is recommended that pre formed bends are used for the marking process

- A protractor can be used
- The tolerance on the bends is +/- 1^0

		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained the 15mm hot passover on the bottom of the basin clearance (20mm)	**C1**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm
Maintained the 15mm cold passover on the bottom of the toilet clearance (20mm)	**C2**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm

Section D Plumb and level

When checking for plumb and level the bubble in the spirit level must not break the line on the display.

		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained the correct fall on the basin waste horizontal run to the sub stack	**D1**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb on the cold 15mm Cu pipe vertical run to basin tap	**D2**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb on the 15mm Cu pipe between passover bends	**D3**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb across passover bends on hot feed to basin	**D4**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained level on horizontal cold feed from basin to left hand side wall	**D5**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained level on horizontal hot feed from basin to left hand side wall	**D6**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb on vertical cold feed to the toilet	**D7**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines

Section E Material usage, layout and overall presentation

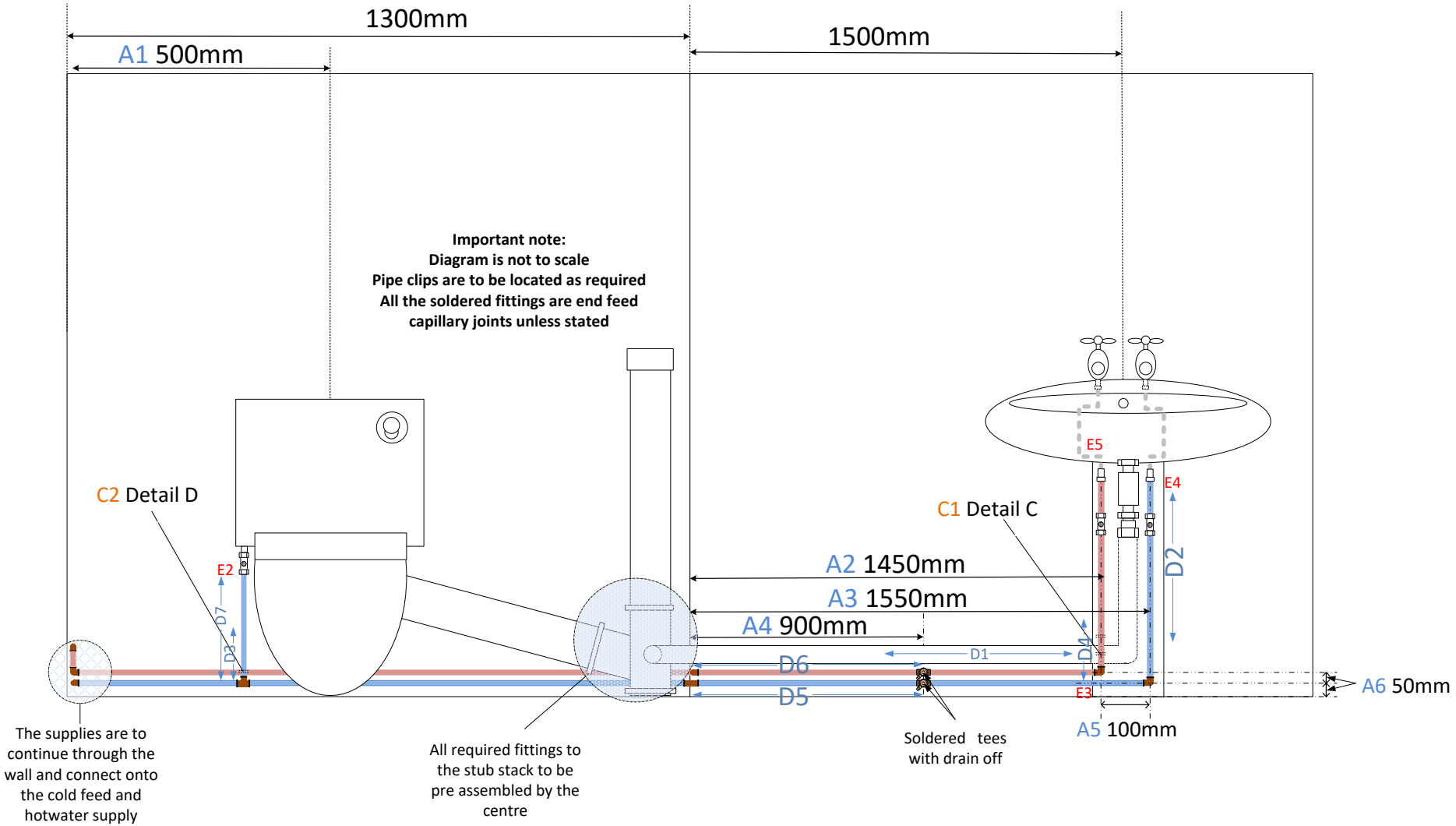
Before the learner starts get them to inspect their work area and identify any marks or burns already present and get the assessor to circle and sign them ensuring they are not taken into account on the final marking. Explain the penalties for extra material/fittings.

- Joint quality look for no tool damage to fittings, pipe entering fitting at 90^0

		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**

Correct clips used and correct spacing	**E1**	☐		
Jointed the bottom compression joint on isolation valve to toilet cistern with no tool damage to fitting and pipe entering fitting at 90^0	**E2**	☐		
Jointed the hot water 15mm elbow joint going to basin and cistern with no solder runs or blobs visible	**E3**	☐		
Jointed the cold water 15mm from copper to flex with no tool damage to fitting and pipe entering fitting at 90^0	**E4**	☐		
Jointed hot water flexible connector to tap with no tool damage to fitting and flex not twisted	**E5**	☐		
Tested the completed installation and no leak found		☐		
Used no extra pipe or couplings and task complete as per drawing (Max 2 x 1m pieces allowed or 2 couplings or 1 piece of pipe and 1 coupling– 1 mark deducted for each 1m length or coupling requested)		☐ +2	☐ +1	☐ No Extra
Sub-totals		/24	/36	/54
Overall Total				/ 60

Task 1 Marking schedule



Performance marking grid

Task 2 - Hot water cylinder Section A Measurement and marking out				
		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained the measurement from the centre of the cylinder to the back wall (450mm)	**A1**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the centre of the cylinder to the left hand wall (450mm)	**A2**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the floor to the centre of the balancing valve (450mm)	**A3**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the centre of the cylinder return to the cold water feed pipe centres (150mm)	**A4**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement between the cylinder flow and return pipes centres (50mm)	**A5**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm

Section B Health and safety

Key points

- PPE must be worn as per centre's own risk assessment
- Tidy work area.

If there is a minor infringement, deduct marks as listed.

No minor infringement (3 marks), 1-2 minor infringements (2 marks), 3 minor infringements (1 mark), 4+ minor infringements and assessment is stopped, and the learner is referred.

The assessment must be stopped immediately if there is a major infringement of health and safety, which would also be classed as a fail.

		Marks		
The learner has		**1**	**2**	**3**
Kept a clean and tidy work area		☐ 3	☐ 1-2	☐ None
Worn PPE as required		☐ 3	☐ 1-2	☐ None

Warnings should be issued where learners are working unsafely and putting themselves and/or others at risk.

Assessor to record infringement(s):

Section C Bends, angles and clearances

This section is only a visual inspection

- Bend quality look for no ripples or bends being pulled.

It is recommended that pre formed bends are used for the marking process

- A protractor can be used
- The tolerance on the bends is +/- 1^0.

		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained the cold feed 15mm passover clearance (20mm) from the balancing valve to the bottom cold feed	**C1**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm
Maintained the hot water supply 22mm 90^0 bend from the cylinder	**C2**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm
Maintained the hot water return 22mm passover clearance (20mm) from the cylinder	**C3**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm

Section D Plumb and level When checking for plumb and level the bubble in the spirit level must not break the line on the display.				
		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained level on the hot 22mm Cu pipe horizontally from the top of the cylinder	**D1**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb on the 15mm Cu pipe between passover bends from the balancing valve to the bottom cold feed	**D2**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb on the vertical hot water feed from the cylinder down the back wall	**D3**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb on the vertical hot water flow to the cylinder	**D4**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb on the vertical hot water return to the cylinder	**D5**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained level on horizontal cold feed from the balancing valve to the cylinder	**D6**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained level on the horizontal hot water return to the cylinder	**D7**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines

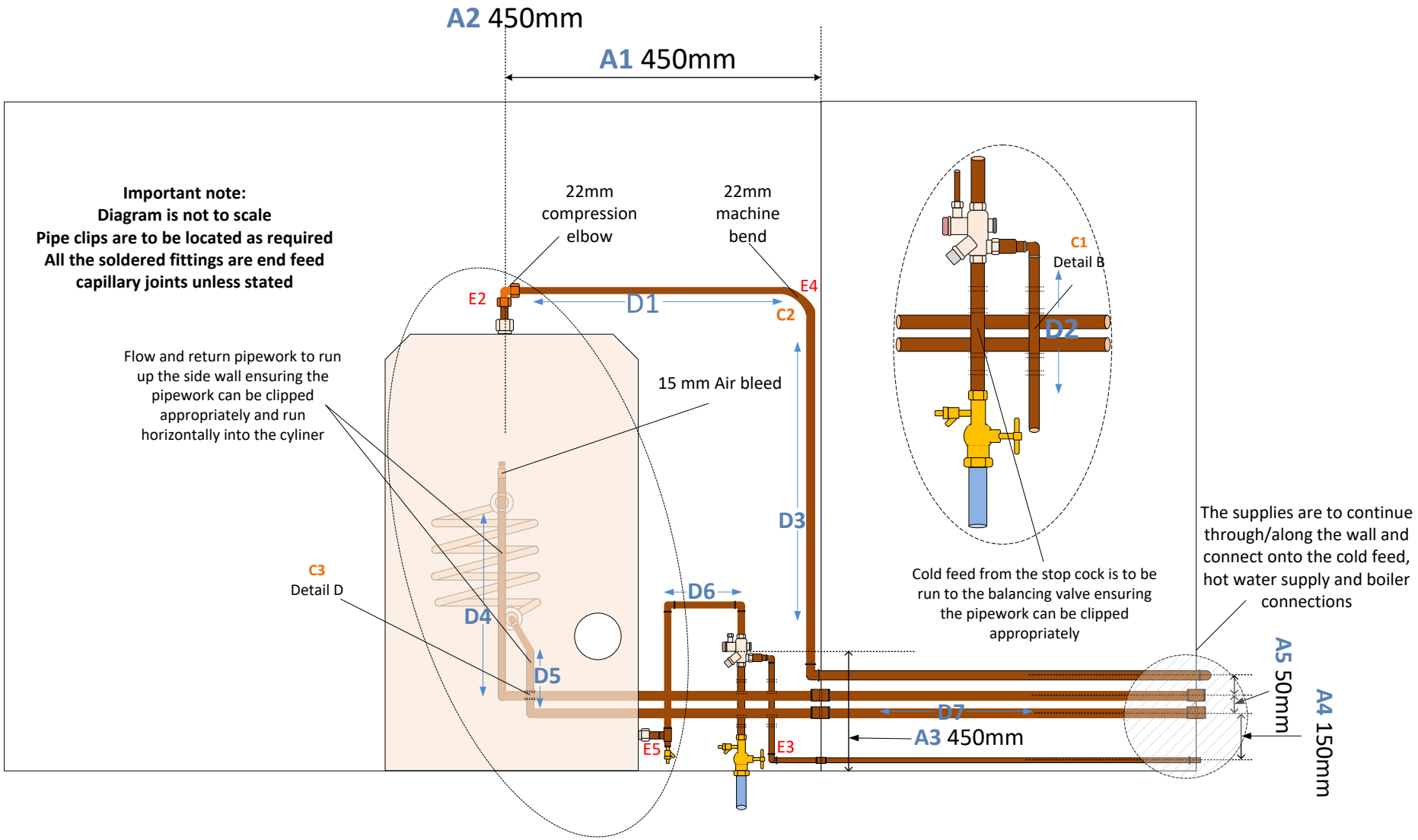
Section E Material usage, layout and overall presentation

Before the learner starts get them to inspect their work area and identify any marks or burns already present and get the assessor to circle and sign them ensuring they are not taken into account on the final marking. Explain the penalties for extra material/fittings.

- Joint quality look for no tool damage to fittings, pipe entering fitting at 90^0

		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Correct clips used and correct spacing	**E1**	☐		
Bottom compression joint on elbow at the top of the cylinder with no tool damage to fitting and pipe entering fitting at 90^0	**E2**	☐		
Cold water 15mm Yorkshire elbow joint going to below the balancing valve with no solder runs or blobs visible	**E3**	☐		
Machine bent the copper hot water supply with no ripples or signs of being pulled	**E4**	☐		
Jointed the tee on the hot water cylinder cold feed with no solder runs or blobs visible	**E5**	☐		
Tested the completed installation and no leak found		☐		
Used no extra pipe or couplings and task complete as per drawing (Max 2 x 1m pieces allowed or 2 couplings or 1 piece of pipe and 1 coupling– 1 mark deducted for each 1m length or coupling requested)		☐ +2	☐ +1	☐ No Extra
Sub-totals		/24	/36	/54
Overall Total				/ 60

Task 2 Marking schedule



Performance marking grid

Task 3 - Central Heating Section A Measurement and marking out				
		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained the measurement from the centre of the boiler jig to the floor (1000mm)	**A1**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement from the centre of the boiler jig to the left hand wall (1100mm)	**A2**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement between the 22mm Cu central heating flow and return horizontal centres from jig to left hand wall (50mm)	**A3**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement between the 15mm plastic central heating flow and return horizontal centres above the radiator (50mm)	**A4**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement between the 15mm Cu Central heating flow and return horizontal centres to the radiator (50mm)	**A5**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm
Maintained the measurement between the 15mm Cu central heating flow and return vertical centres on the wall (50mm)	**A6**	☐ ± 10 mm	☐ ± 5 mm	☐ ± 2 mm

Section B Health and safety

Key points

- PPE must be worn as per centre's own risk assessment
- Tidy work area.

If there is a minor infringement, deduct marks as listed.

No minor infringement (3 marks), 1-2 minor infringements (2 marks), 3 minor infringements (1 mark), 4+ minor infringements and assessment is stopped, and the learner is referred.

The assessment must be stopped immediately if there is a major infringement of health and safety, which would also be classed as a fail.

		Marks		
The learner has		**1**	**2**	**3**
Kept a clean and tidy work area		☐ 3	☐ 1-2	☐ None
Worn PPE as required		☐ 3	☐ 1-2	☐ None

Warnings should be issued where learners are working unsafely and putting themselves and/or others at risk.

Assessor to record infringement(s):

Section C Bends, angles and clearances

This section is only a visual inspection

- Bend quality look for no ripples or bends being pulled.

It is recommended that pre formed bends are used for the marking process

- A protractor can be used
- The tolerance on the bends is +/- 1^0.

		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained the flow 22mm passover clearance (20mm)	**C1**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm
Maintained the return 22mm passover clearance (20mm)	**C2**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm
Maintained the heating flow 22mm 90^0 bend	**C3**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm
Maintained the heating return 22mm 90^0 bend	**C4**	☐ ± 6 mm	☐ ± 4 mm	☐ ± 2 mm

Section D Plumb and level

When checking for plumb and level the bubble in the spirit level must not break the line on the display.

		Marks		
The learner has	**Aspect ID**	**1**	**2**	**3**
Maintained level across the top of the boiler jig	**D1**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained level across the top of the radiator	**D2**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb on top plastic feed above the radiator	**D3**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb across all the drain cocks on the flow and returns	**D4**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines
Maintained plumb across machine bend on the heating return	**D5**	☐ ± 4 mm	☐ ± 2 mm	☐ within lines

Section E Material usage, layout and overall presentation

This section is only a visual inspection

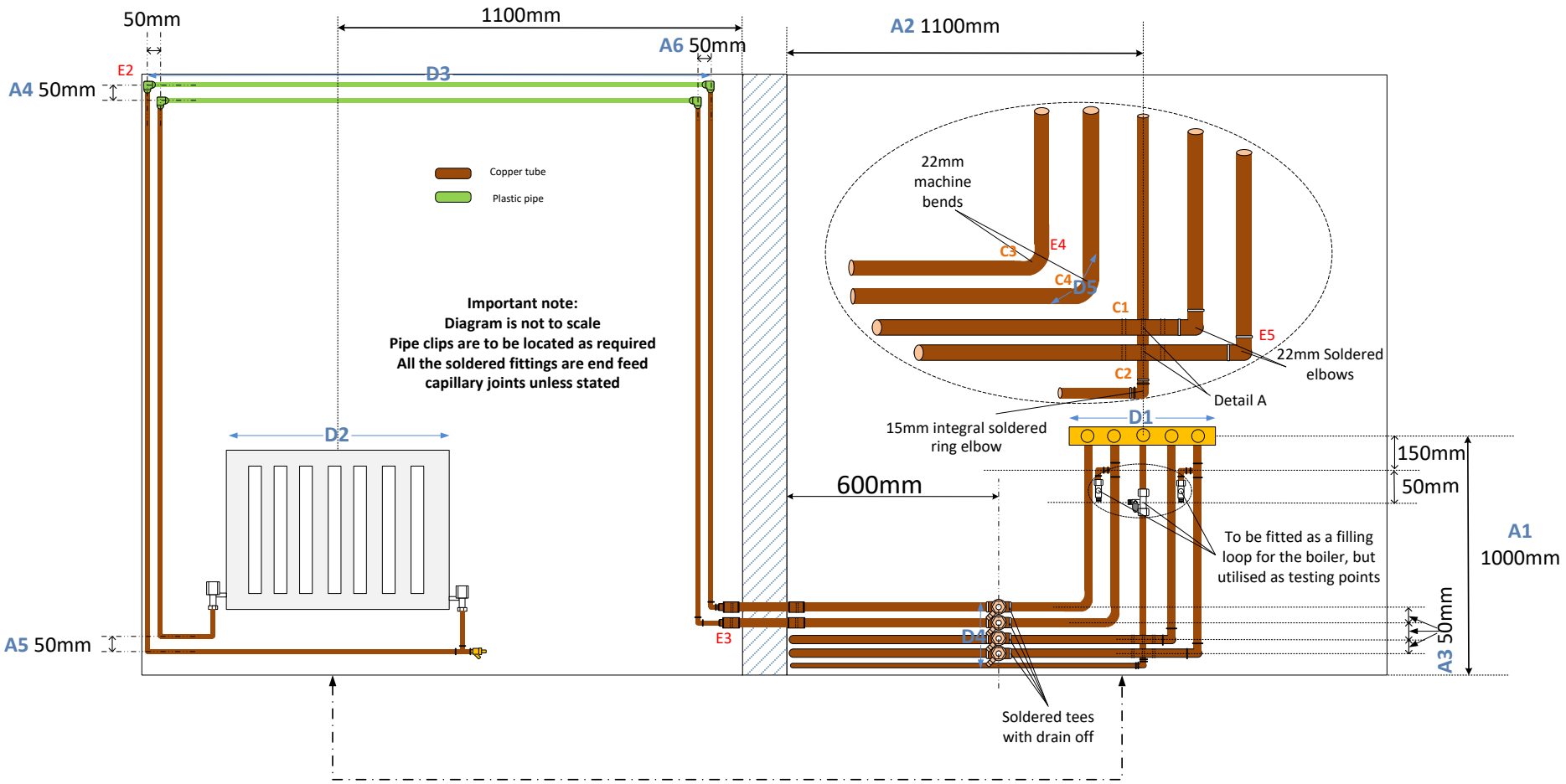
- Joint quality look for no tool damage to fittings, pipe entering fitting at 90^0
- Bend quality look for no ripples or bends being pulled.

Explain the penalties for extra material/fittings.

Any testing to be completed within the specific time (learners are permitted to test the separate installations as many times as they require, but the official test with the assessor can only be performance once and this is the result that must be recorded)

		Marks		
The learner has	**Aspect ID 7**	**1**	**2**	**3**
Correct clips used and correct spacing	**E1**	☐		
Jointed the top left 15mm flow push fit fitting with no tool damage to fitting and pipe entering fitting at 90^0	**E2**	☐		
Jointed the reducer on the heating return with no solder runs or blobs visible	**E3**	☐		
Machine bent the copper heating flow with no ripples or signs of being pulled	**E4**	☐		
Jointed the elbow on the hot water return with no solder runs or blobs visible	**E5**	☐		
Tested the completed installation and no leak found		☐		
Used no extra pipe or couplings and task complete as per drawing (Max 2 x 1m pieces allowed or 2 couplings or 1 piece of pipe and 1 coupling– 1 mark deducted for each 1m length or coupling requested)		☐ +2	☐ +1	☐ No Extra
Sub-totals		/24	/36	/54
Overall Total				/ 60

Task 3 Marking schedule



Evaluation marking grid

Learner name:	
Assessment date:	

Evaluate completed work against the task brief, plan and success criteria	**Mark achieved**
• does not produce a **coherent** evaluation • does not reflect in an evaluative report the main outcomes of the project	**0**
or	
• produced a **coherent** evaluation • reflects on their own performance in an evaluative report of the **main outcomes** of the project tasks	**1**
or	
• produced a **coherent and considered** evaluation • describes in the evaluative report their **performance against their plan, success criteria and the task requirements** covering the **main activities and outcomes for all tasks**	**2**
or	
• produced an **extensive comprehensive** evaluation • **evaluates fully** in a well written evaluative report **their performance against their plan, success criteria and the task requirements** demonstrating their **own strengths/weaknesses and lessons learnt**	**3**
Mark achieved	
Total = Mark achieved × 14	**/42**

Marks within the evaluation section of the Practical Project, are to be multiplied by 14 to create the total marks for this section of the project.

Overall Practical Project mark

This table indicates the total marks available within each section of the practical project and the minimum mark which must be gained within each section.

Project Section	Marks Available	Marks Awarded	Threshold Pass Mark
Planning (highest scoring plan)	90		30
Trade Task 1	60		24
Trade Task 2	60		24
Trade Task 3	60		24
Evaluating	42		14
Total	312		116

Assessor Name: _____ Learner name: _____

Assessor signature: _____ Date: _____

Marks awarded within each section must be totalled and combined to create and overall project mark, the table below indicates the grade to be awarded based on the learner's overall mark.

Please note: the threshold pass mark indicates the minimum score that learners must achieve in each section of the project, but does not set the minimum score which must be achieved overall – the total mark required to pass this assessment can be found in the table below.

Determining overall grade

The table below identifies how many marks overall are required to achieve each grade within this assessment component:

Total Mark	Grade	Points
0 - 115	Fail	0
116 - 143	P1	1
144 - 171	P2	2
172 - 199	M1	3
200 - 227	M2	4
228 - 255	D1	5
256 - 283	D2	6
284 - 312	D3	7

The assessor must use this table to calculate a provisional grade for the learner. Notification of this provisional grade must be given to the learner within one week of completion of the assessment, with guidance given on the provisional nature of the grade. Provisional results will be subject to internal quality assurance procedures, followed by external quality assurance activity completed by EAL. Results will be submitted to EAL and the final assessment grade aggregated with the other assessment methods to award an overall qualification grade, which will be issued by EAL.

Practical Project provisional grade

Learner name	
Date	
Total mark achieved	
Provisional Practical Project grade	
Assessor name	
Assessor signature	

3.2 Electrical assessment brief

You firm has been contracted by a client to carry out three electrical installations. These are shown in the following task specifications and will form part of one overall project. The electrical supply at the consumer unit is 230 V AC.

This project has three elements: planning, performing, and evaluating.

You have:

- **14 hours** allocated for the planning of all three tasks (planning)
- **40 hours** allocated to carry out the three tasks (performing)
- **6 hours** to evaluate the three tasks in the project (evaluating).

You may not use the time you have been given for each element for another element, i.e. If you complete your planning in 12 hours you may not use the other two hours for either the performing or the evaluating.

You will be required to devise a plan showing the approach you will take to undertake the work required in the performance tasks, underpinned by an overall schedule of works.

Once the installation has been completed you will be required to evaluate your work.

You must adhere to all relevant health and safety rules and procedures at all times.

Learner guidance task 1

This task involves the installation of 2 circuits consisting of:

- A **two-way and intermediate lighting circuit** wired in 1 mm^2 PVC/PVC flat profile cable clipped direct. Use the loop in method of wiring. A smoke alarm is also wired on the circuit.

- A **ring final circuit wired** in PVC/PVC flat profile cable clipped direct to the switched socket outlets (SSO), and in mini trunking (MT2, with a mitred bend) to the switched fused connection unit (SFCU). The SFCU wired via a spur from the origin of the ring final circuit. The 32 A joint box wired from the SFCU is to simulate a 500 W load. Install the appropriate minimum rated fuse for this load in the SFCU. The JB is fed via 1 mm^2 flex, clipped direct (use a 20 mm stuffing gland at SFCU).

As part of the planning element, you will need to:

- produce a wiring diagram for the lighting circuit
- select the appropriately rated protective device for the lighting circuit
- select the appropriate cable size (minimum conductor CSA mm^2), and protective device rating for the ring final circuit using standard circuit arrangement information (from the IET On-Site Guide)
- select the appropriate minimum rated fuse for the 500 W load.

You may also use any relevant notes or publications to assist you in the task.

The consumer unit and metallic water pipe are pre-fixed. Carry out main protective bonding to the water pipe and terminate the cable conductor to the clamp using the correct sized crimped ring lug.

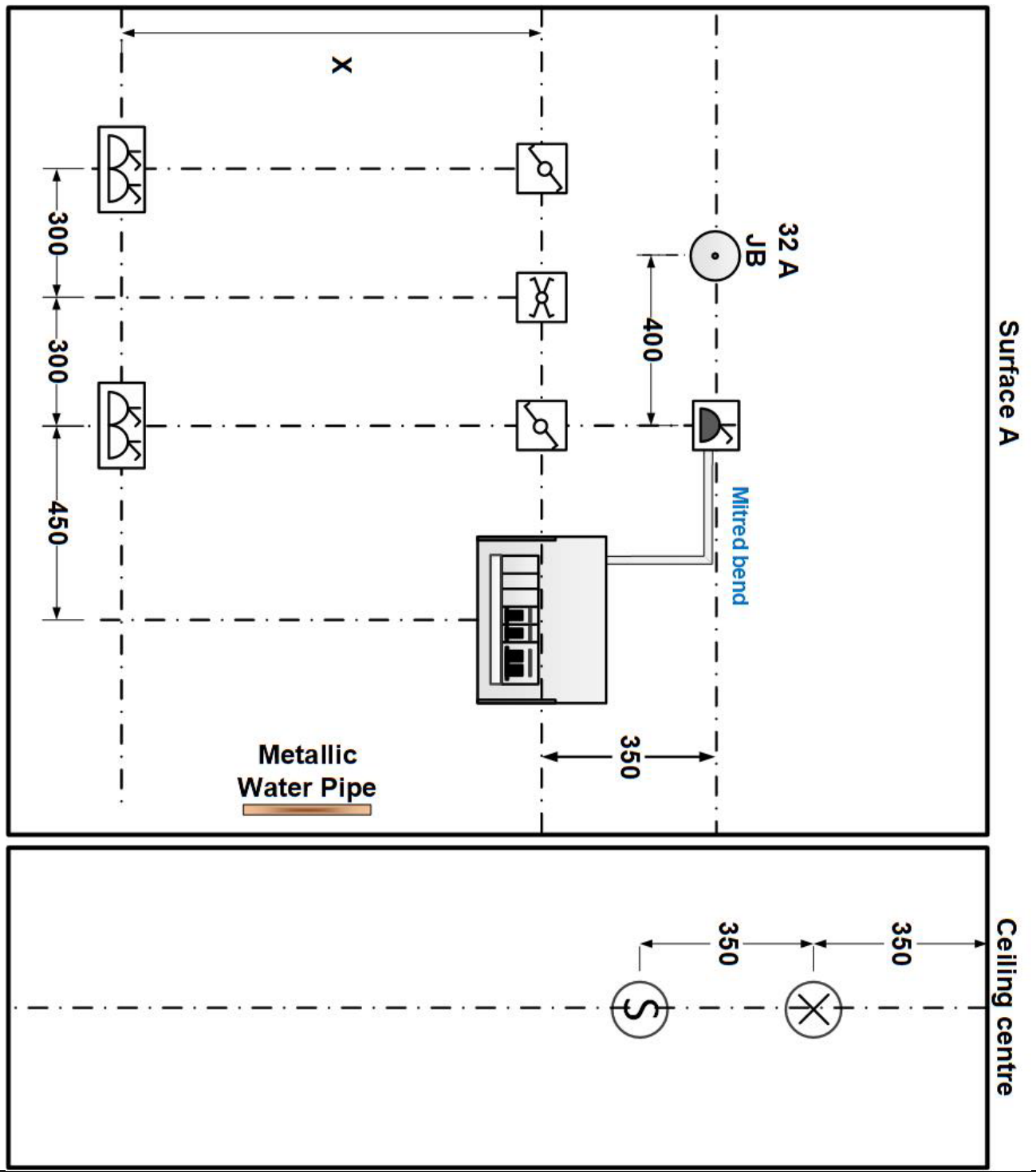
Measurements, components and layout may be altered by your assessor to suit local facilities.

Install in accordance with industry practices, current requirements of BS 7671 and the IET On-Site Guide. Carry out de-energised tests (continuity of protective conductor, continuity of ring final circuits, insulation resistance and polarity) **and record your test results.**

You should inspect your work as you carry out the installation.

You must always work safely when carrying out this task.

Task 1 Specification



DRAWING NOT TO SCALE. All measurements in mm.

Celling centre: the dotted line represents the centre of the ceiling, so clipping distances to the ceiling components from the consumer unit will be dependent on the size of the bay. Dimension 'X' specified by the Assessor.

Assessor guidance task 1

As part of the planning element for the assessment, the learner will need to produce a wiring diagram for the lighting circuit and select the relevant materials/components which are not stated in the instructions (i.e. cables and protectives devices) for inclusion in their materials list. They may also use other relevant notes/publications to help them complete the task.

The consumer unit and metallic water pipe are pre-fixed. The learner is to carry out main protective bonding to the water pipe crimping the correct sized ring lug. Measurements and layout may be altered to suit local facilities. Specify dimension X. Components may be substituted.

The learner is required to:

- carry out the installation in accordance with industry practices, current requirements of BS 7671 and the IET On-Site Guide.
- carry out de-energised tests (continuity of protective conductor, continuity of ring final circuits, insulation resistance and polarity) and record their test results.

Centres need to make available a suitable area for the learners.

Learners are expected to work independently throughout the task.

Task 1 Resource list

Materials	**Quantity**
Mini trunking (MT2)	700 mm
1 gang 2-way switch	2
1 gang intermediate switch	1
Pendant set	1
SFCU and fuse	1
2 gang SSO	2
Surface mount single pattress box – light switches	3
Surface mount box – SFCU	1
20 mm stuffing gland	1
Surface mount double pattress - SSO	2
32 A JB	1
1mm^2 Flex	450 mm
Mini trunking surface box adaptor	2
6 A Type B CB	1
32 Type B CB	1
Smoke alarm (or suitable simulated head)	1
- and any additional materials/suitable alternatives to the materials stated	N/A

Sundries:

- Wood screws
- Cable clips
- Green and yellow sleeving
- Brown sleeving
- Lamp
- Consumer unit and blanks if required
- BS 1362 fuse and incorrect ratings for the SFCU
- PVC/PVC flat profile cable 1 mm^2
- PVC/PVC flat profile cable 2.5 mm^2
- Metal pipe (for protective bonding)
- Ring lug for the protective bonding and a range of incorrect sizes.

Tools and equipment:

- Selection of electrician's hand tools
- Hacksaw
- Mitre square
- Crimping tool for the protective bonding conductor
- Test equipment for de-energised tests.

Learner guidance task 2

This task involves the installation of 3 circuits consisting of:

- A **ring final socket outlet circuit** wired in PVC single core cables in PVC conduit.
- A **lighting circuit** to 2 light fittings wired in 1 mm^2 PVC single core cables in PVC conduit.

  Lamp **A** is controlled from two positions by switches **A**.
  Lamp **B** is controlled by switch **B**.

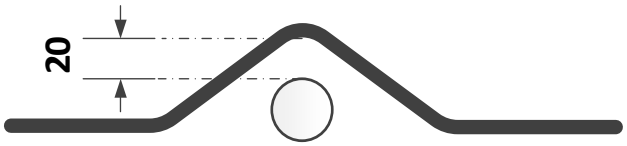
- A 6-amp **radial final circuit** to a smoke alarm wired in 1.0 mm^2 fire performance cable e.g. FP200 (not MIMS) .

As part of the planning element, you will need to:

- produce a wiring diagram for the lighting circuit
- select the appropriate cable size (minimum conductor CSA mm^2), and protective device rating for the ring final circuit using standard circuit arrangement information (from the IET On-Site Guide)
- select the appropriately rated protective device for the lighting circuit.

You may also use any relevant notes or publications to assist you in the task.

The obstruction (20 mm piece of conduit) is pre-fixed mid-way between the consumer unit and SSO. The set over the obstruction should give **20 mm clearance.**



Measurements, components and layout may be altered by your assessor to suit local facilities.

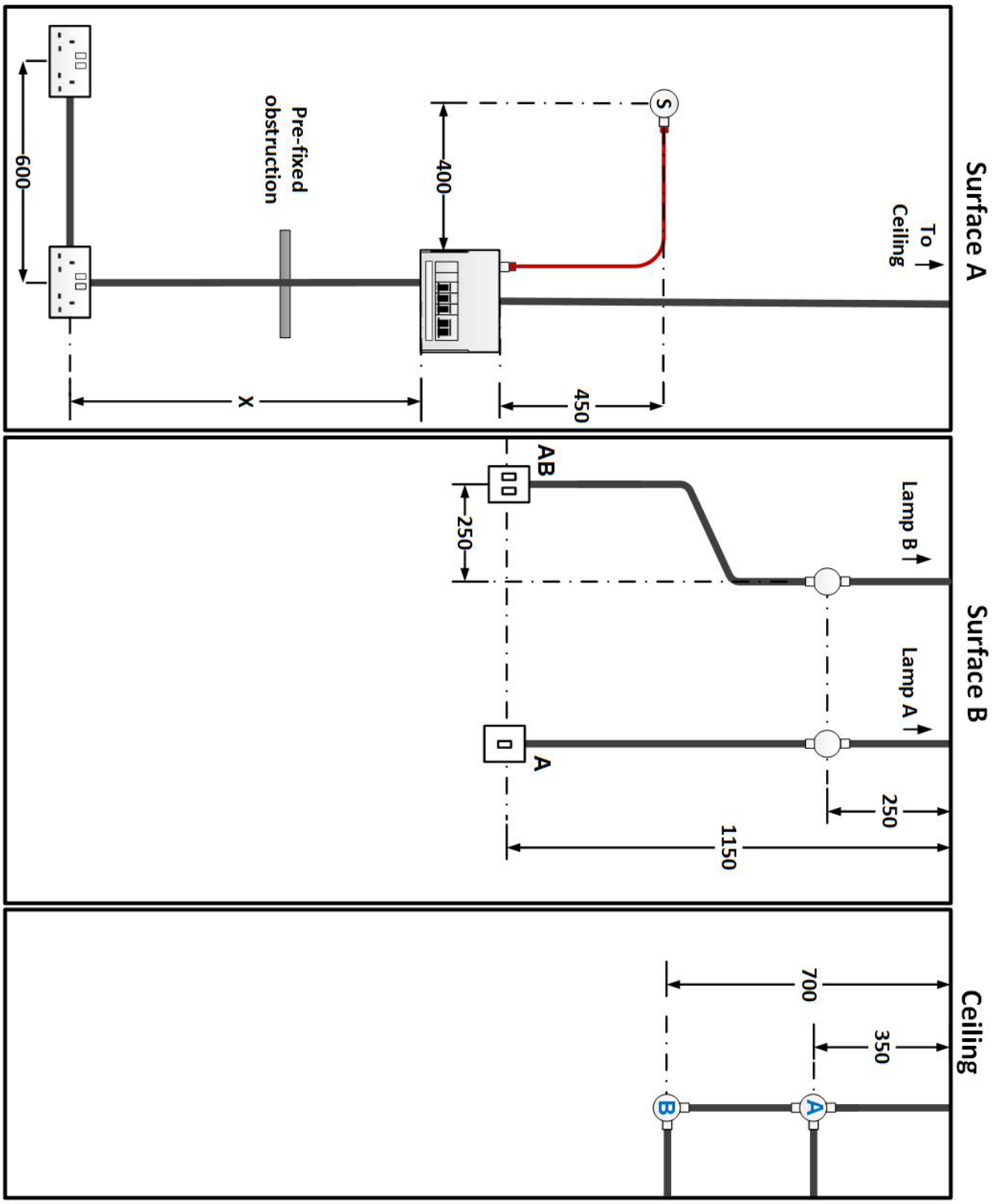
Install in accordance with industry practices, current requirements of BS 7671 and the IET On-Site Guide.

You should inspect your work as you carry out the installation.

Carry out de-energised tests (continuity of protective conductor, continuity of ring final circuits, insulation resistance and polarity) **and record your test results.**

You must always work safely when carrying out this task.

Task 2 Specification



DRAWING NOT TO SCALE. All measurements in mm.

Offset on surface B to switch AB is 250 mm centre to centre of the conduit. Offset can be anywhere in conduit length. Dimension 'X' specified by the Assessor.

Assessor guidance task 2

As part of the planning element for the assessment, the learner will need to produce a wiring diagram for the lighting circuit and select the relevant materials/components which are not stated in the instructions (i.e., cables and protectives devices) for inclusion in their materials list. They may also use other relevant notes/publications to help them complete the task.

The consumer unit is pre-fixed.

Measurements and layout may be altered to suit local facilities. Specify dimension X Components may be substituted.

The learner is required to:

- install in accordance with industry practices, current requirements of BS 7671 and the IET On-Site Guide.
- carry out de-energised tests (continuity of protective conductor, continuity of ring final circuits, insulation resistance and polarity) and record their test results.

Centres need to make available a suitable area for the learners.

Learners are expected to work independently throughout the task.

Task 2 Resource list

Materials	**Quantity**
2 gang SSO	2
2 gang 2-way switch	1
1 gang 2-way switch	1
Baton holder/light fitting	2
20 mm PVC conduit through box	2
20 mm PVC conduit angle box	1
20 mm PVC conduit tee box	1
20 mm terminal end box	1
PVC conduit box lids	2
20 mm PVC conduit	approx. 7.5 m depending on bay size
Conduit female adaptors 20 mm	7
2 Gang 20 mm PVC back box	2
1 Gang 20 mm PVC back box	2
6 A Type B CB	2
32 A Type B CB	1
Fire performance cable (not MIMS)	Approx. 1 m
20 mm Coupler	1
Smoke detector (or suitable simulated head)	1
- and any additional materials/suitable alternatives to the materials stated	N/A

Sundries:

- Wood screws
- M4 Box lid screws
- 20 mm saddles
- P Clips
- Green and yellow sleeving
- Lamps
- Consumer unit and blanks if required
- PVC single core cables 1 mm^2
- PVC single core cable (green and yellow) 1.5 mm^2
- PVC single core cables 2.5 mm^2
- Metal pipe (obstruction).

Tools and equipment:

- Selection of electrician's hand tools
- Hacksaw
- Bending spring
- Draw wire
- Insulation tape
- Cable dispenser/drum stand
- Test Equipment for de-energised tests.

Learner guidance task 3

This task involves the installation of 2 circuits consisting of:

- A 10 A **radial final circuit** to a switched fused connection unit (SFCU) wired in 1.5 mm^2 PVC/SWA, which then supplies box 1 in drawing, wired in SY cable (use a glanding nut). SY cable conductors terminated into connector blocks in Box A. For the SWA use a 'banjo' with a CPC tail at both ends.

- A **ring final circuit** to two 1 gang socket outlets wired in PVC single core cables in steel conduit.

As part of the planning element, you will need to:

- show by means of a drawing **ONE** of the following:
    - how the SY cable is terminated, or
    - how the SWA cable is terminated, or
    - how the tray bend is fabricated
      (you may select which drawing to produce).

- you are also required to select the appropriate cable size (minimum conductor CSA mm^2), and protective device rating for the ring final socket circuit using standard circuit arrangement information (from the IET On-Site Guide).

You may also use any relevant notes or publications to assist you in the task.

From the provided materials, select and install suitably sized cables and overcurrent protective devices with appropriate ratings (A).

The box wired from the SFCU is to simulate a 715 W load. Install the appropriate minimum rated fuse for this load in the SFCU. Consumer unit is pre-fixed.

Fabricate a sweeping 90° tray bend as shown on the task 3 specification drawing.

Measurements, components and layout may be altered by your assessor to suit local facilities.

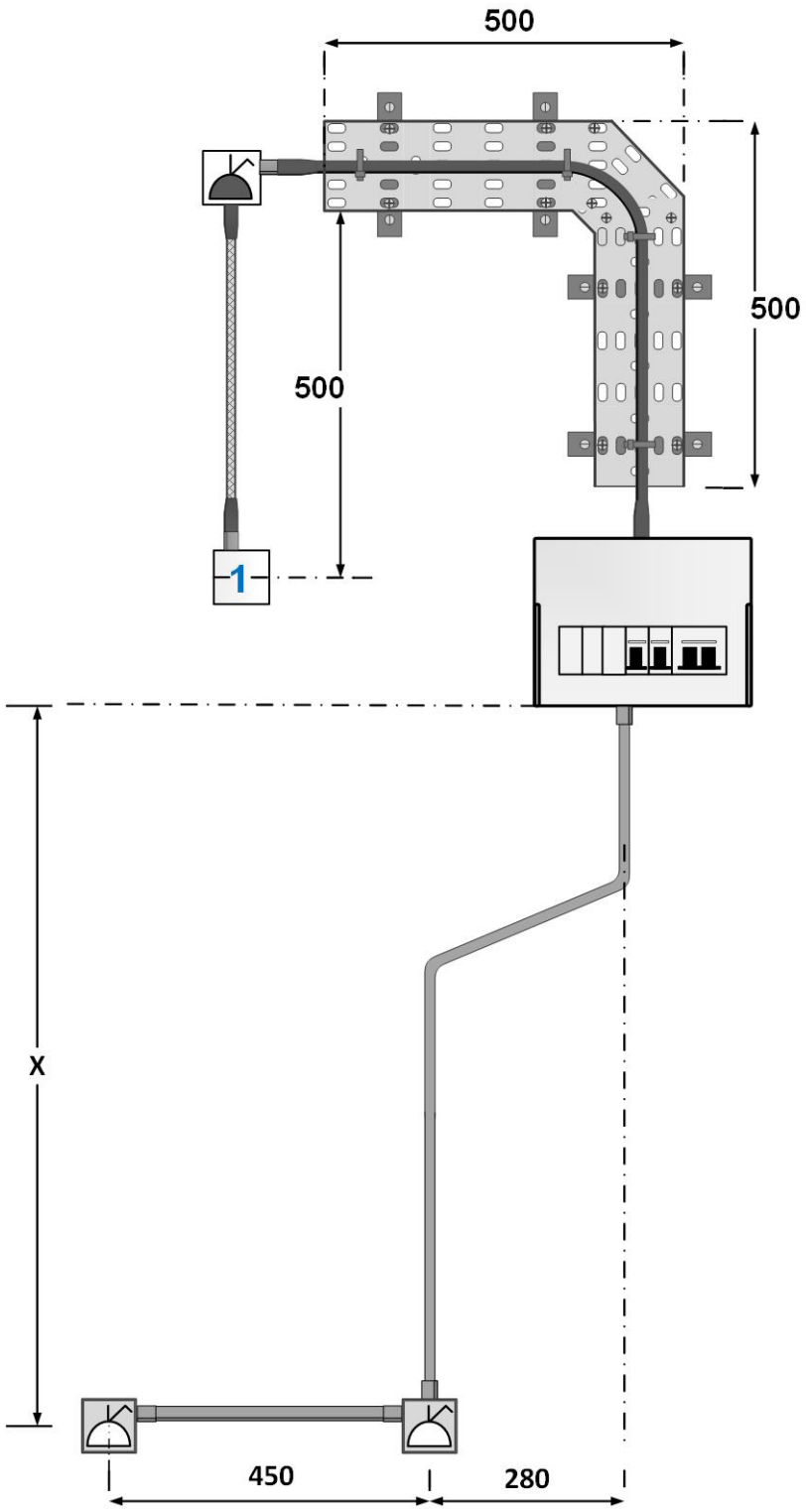
Install in accordance with industry practices, current requirements of BS 7671 and the IET On-Site Guide.

You should inspect your work as you carry out the installation.

Carry out de-energised tests (continuity of protective conductor, continuity of ring final circuits, insulation resistance and polarity) **and record your test results.**

You must always work safely when carrying out this task.

Task 3 Specification



DRAWING NOT TO SCALE. All measurements in mm.

Offset to SSO is 280 mm centre to centre of the conduit. Offset can be anywhere in conduit length. Dimension 'X' specified by the Assessor.

Assessor guidance task 3

As part of the planning element for the assessment, the learner will need to select the relevant materials/components which are not stated in the instructions (i.e., cables and protectives devices) for inclusion in their materials list. The learner will also need to produce a drawing to show how either the SY cable is terminated or the SWA cable is terminated, or how the tray bend is fabricated. The learner can decide which of the drawings to produce. They may also use other relevant notes/publications to help them complete the task.

The consumer unit is pre-fixed. The learner is required to fabricate the sweeping 90° tray bend. A guide on how to do this out of three pieces of tray is given for the assessor, alternatively the bend could be fabricated out of one piece of tray. The hole in the metal back box for the 'banjo' may be pre-drilled (to enable reuse of back boxes).

Measurements and layout may be altered to suit local facilities. Specify dimension X Components may be substituted.

The learner is required to:

- install in accordance with industry practices, current requirements of BS 7671 and the IET On-Site Guide.
- carry out de-energised tests (continuity of protective conductor, continuity of ring final circuits, insulation resistance and polarity) and record their test results.

Centres need to make available a suitable area for the learners. Learners are expected to work independently throughout the task.

Note that at the time of writing SY cable is a departure from BS 7671. Where SY cable is used in real life the designer or responsible person for the installation would need to record its use as a departure and provide evidence that the use of SY cable will not result in a lesser degree of safety than that afforded by compliance with BS 7671.

Task 3 Resource list

Materials	**Quantity**
1 gang socket outlet	2
SFCU and fuse	1
20 mm steel conduit	1.8 m
Steel cable tray	Approx. 1.5 m
Tray brackets	4
Steel conduit couplers	4
Brass male bush	4
1 Gang 20 mm steel back box	3
10 A Type B CB	1
32 A Type B CB	1
1 mm^2 SY Cable (or suitable alternative)	Approx. 800 mm
SY Glands	2
1.5 mm^2 SWA cable	Approx. 1.6 m
SWA Glands	2
- and any additional materials/suitable alternatives to the materials stated	N/A

Sundries:

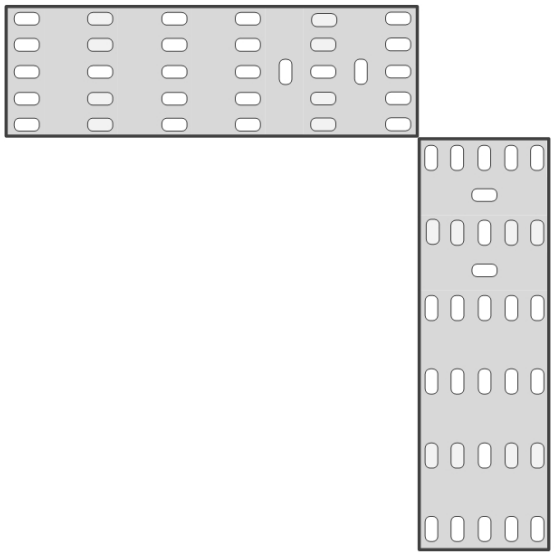
- Screws
- 20 mm saddles
- BS 1362 fuse and a selection of incorrect ratings for the SFCU
- Consumer unit (and blanks if required)
- PVC single core cables 2.5 mm^2
- Cable ties

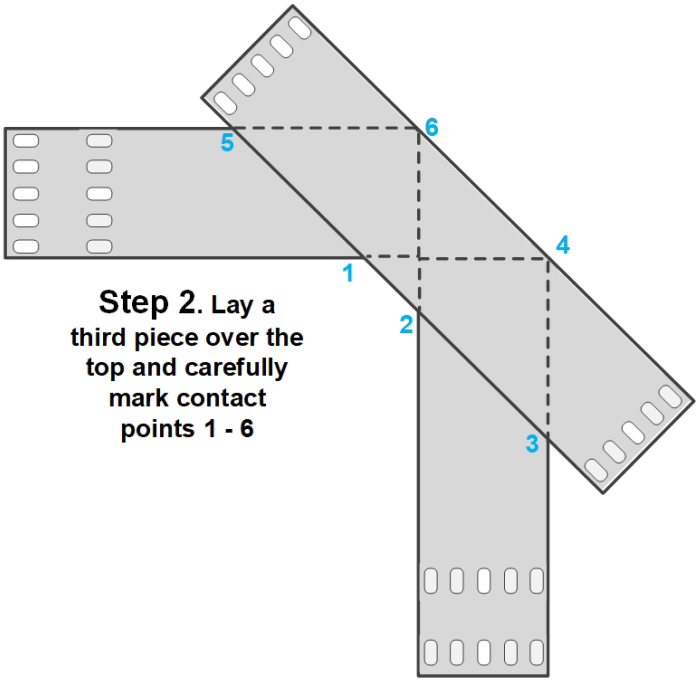
Tools and equipment:

- Selection of appropriate electrician's hand tools
- Hacksaw
- Conduit bender 20 mm
- Draw wire
- Reamer
- File
- Insulation tape
- Cable dispenser/drum stand
- Test Equipment for de-energised tests.

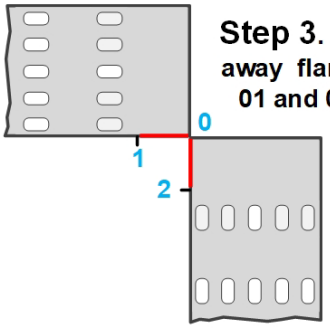
Assessor guide on fabricating the sweeping 90° tray bend using three pieces of cable tray. Other methods (such as using one piece of tray) to produce the sweeping bend are absolutely acceptable. Will require set square and appropriate hand tools.

Step 1. Lay two pieces of tray and form a 90° angle

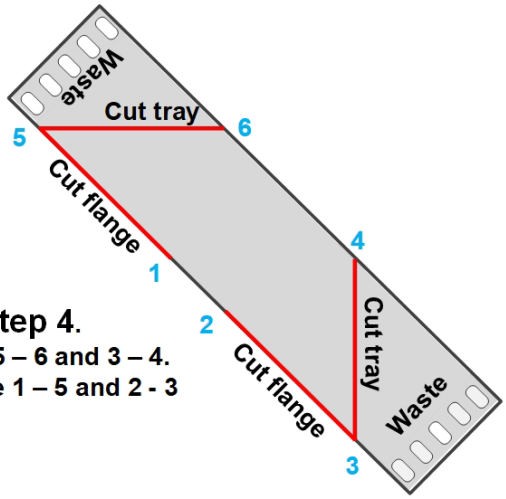




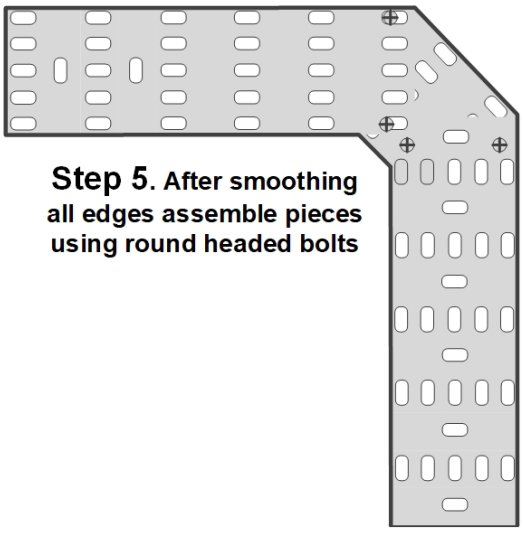
Step 2. Lay a third piece over the top and carefully mark contact points 1 - 6



Step 3. Cut away flange 01 and 02



Step 4.
Cut tray 5 – 6 and 3 – 4.
Cut flange 1 – 5 and 2 - 3



Step 5. After smoothing all edges assemble pieces using round headed bolts

Marking grids

Using the marking descriptors provided below for each assessment element, please indicate the marks awarded for each element. If the learner does not achieve the descriptors listed against an individual element (a, b, c, etc) a score of 0 must be awarded for that element. Marks must then be totalled for each section (including the use of any scaling factors, shown in the tables below) to create an overall mark for the project.

Planning marking grid

Learner name:	
Assessment date:	

a) Identify resource requirements to meet the task	**Mark achieved**
• produces a **coherent resource list** identifying the key basic tools and materials required to complete the main project aspects.	**1**
or	
• produces **a thorough quantified resource list** including relevant tools and materials required to complete the task (some items may be omitted in the list).	**2**
or	
• produces a **full and complete quantified resources list** with materials, tools, and any relevant equipment and sundries listed.	**3**
b) Plan the activities and the ordering/phasing of work to complete the task	**Mark achieved**
• produces **coherent** method statement, risk assessment and drawing/diagram **with an estimated completion date**.	**1**
or	
• **correctly interpret diagrams** provided to produce a **coherent and considered** method statement, risk assessment and drawing/diagram, with **milestones identified**.	**2**
or	
• **correctly interpret diagrams** to produce a **comprehensive** method statement, risk assessment and drawing/diagram, with **detailed**, **considered milestones** as relevant to the task.	**3**

c) The main techniques used for estimating jobs/projects in building services	Mark achieved
• produces an estimate which includes an **overview of work to be undertaken**, an **accurate duration and overall price** to the customer	**1**
or	
• produces an estimate which includes an **overview of work to be undertaken**, an **accurate duration and overall price** to the customer which shows **how total cost and profit margin were used to determine this**	**2**
or	
• produces an estimate which includes a **clear overview of work to be undertaken**, an **accurate duration and overall price** to the customer which **shows a detailed breakdown of all costs used to determine thi**s	**3**
d) How to estimate time requirements	**Mark achieved**
• produces a method statement, including a schedule of works, that identifies the **key basic activities and overall task timings** on the project	**1**
or	
• produces a method statement, including a schedule of works, that identifies the **main tasks and activities** and **estimates time requirements** for these	**2**
or	
• produces a method statement, including a schedule of works, that includes **realistic estimates** for time requirements of key activities within tasks and for overall project, and identifies relevant **dependencies** between activities and tasks	**3**
e) Identify success criteria for the task	**Mark achieved**
• sets **coherent** success criteria in their plan • states key success criteria for the project task	**1**
or	
• sets **coherent and considered** success criteria in their plan • describes their relevance to the main aspects of the task	**2**
or	
• sets **comprehensive** success criteria in their plan • justifies why those success criteria have been chosen and relates them to the task	**3**
Mark achieved	/15
Total = Mark achieved × 6	**/90**

Only the mark from the highest scoring plan will contribute to the overall project mark.

Marks within the planning section of the Practical Project, are to be multiplied by 6 to create the total marks for this section of the project.

Performance marking grid

Task 1 **Section A: Positioning and fixing**				
		Marks		
The learner has		**1**	**2**	**3**
Socket outlets and SFCU Positioned and fixed each point securely +- 5 mm from given dimension (1 mark each)		☐	☐	☐
Light switches Positioned and fixed each point securely +- 5 mm from given dimension (1 mark each)		☐	☐	☐
Installed switches level (1 mark) Installed sockets and SFCU level (1 mark) Installed cables (clipped) horizontally/vertically correct where relevant (1 mark)		☐	☐	☐
Joint box, pendant set, alarm Positioned and fixed each point securely +- 5 mm from given dimension (1 mark each)		☐	☐	☐
Cable clipping Clipped PVC/PVC cables equidistantly/neatly for the: ring final circuit (1 mark), lighting circuit (1 mark), protective bonding & SFCU Flex (1 mark)		☐	☐	☐
Section B: Connection and termination				
		Marks		
The learner has		**1**	**2**	**3**
Socket outlets and SFCU Installed cable sheath into accessory, sufficient slack, no damage, sleeved CPC, terminated conductors electrically and mechanically sound with no undue removal of cable insulation (1 mark for each point on circuit)		☐	☐	☐
Light switches Given sufficient slack, no damage, terminated conductors electrically and mechanically sound with no undue removal of cable insulation sleeved CPC and switch wire (1 mark for each switch)		☐	☐	☐
Joint box, pendant set, alarm Installed cable sheath into accessory, sufficient slack, no damage, sleeved CPC, terminated conductors electrically and mechanically sound with no undue removal of cable insulation 1 x joint box (1 mark) 1 x pendant set (1 mark) 1 x smoke alarm (1 mark)		☐	☐	☐

Consumer unit Installed and terminated all cables/conductors correctly using where appropriate corresponding N and E bar sequence to CU ways. Lighting circuit (1 mark), ring final circuit (1 mark), protective bonding (including correct size cable) (1 mark)	☐	☐	☐
Protective bonding (at clamp) Fitted clamp correctly (1 mark), terminated cable securely and correctly at clamp with crimped ring lug (1 mark), fitted label correctly (1 mark)	☐	☐	☐

Section C: Health and safety

Key points

- PPE must be worn as per centre's own risk assessment (e.g. safety glasses and safety boots)
- Tidy work area

If there is a minor infringement, deduct marks as listed.

No minor infringement (3 marks), 1-2 minor infringements (2 marks), 3 minor infringements (1 mark), 4+ minor infringements and assessment is stopped, and the learner is referred.

The assessment must be stopped immediately if there is a major infringement of health and safety, which would also be classed as a fail.

		Marks		
The learner has		**1**	**2**	**3**
Kept a clean and tidy work area		☐ 3	☐ 1-2	☐ None
Worn PPE as required		☐ 3	☐ 1-2	☐ None

Warnings should be issued where learners are working unsafely and putting themselves and/or others at risk. Assessor to record infringement(s):

Section D: Mini trunking				
		Marks		
The learner has		**1**	**2**	**3**
Fixed all mini trunking securely (1 mark) Fitted mini trunking and lid with gaps ≤ 2 mm between switches and joint box (straight sections) (2 marks)		☐	☐	☐
Mitred mini trunking and lid at 90° bend within gap tolerance of:		☐ 2 mm	☐ 1 mm	☐ No Gap
Section E: Circuits				
		Marks		
The learner has		**1**	**2**	**3**
Lighting circuit Wired the lighting circuit correctly (two-way and intermediate) (3 marks)		N/A	N/A	☐
Wired ring final circuit sockets correctly (2 marks) Wired SFCU correctly (1 mark)		☐	☐	☐
Cables and protective devices Lighting circuit: Used appropriate rating of CB and stated conductor size for the (1 mark) Ring final circuit: CB rating and minimum conductor size as per standard circuit arrangement (IET On-Site Guide) (1 mark) Suitable minimal rating of fuse (3 A) in SFCU (1 mark)		☐	☐	☐
Section F: Material usage				
		Marks		
The learner has		**1**	**2**	**3**
Requested no additional materials due to wastage		☐ 2 requests	☐ 1 request	☐ No extra requested
Section G: Testing				
		Marks		
The learner has		**1**	N/A	N/A
Carried out continuity of CPC testing		☐		
Carried out test for continuity of ring final circuit		☐		
Carried out IR testing		☐		
Carried out polarity testing		☐		
Recorded results		☐		
Results acceptable		☐		
Sub-totals		/23	/34	/54
Overall Total				/ 60

Performance marking grid

Task 2 **Section A: Positioning and fixing**				
		Marks		
The learner has		**1**	**2**	**3**
Socket outlets and isolator Positioned and fixed each point securely +- 5 mm from given dimension 2 x socket outlets (1 mark each) 1 x smoke alarm (1 mark)		☐	☐	☐
Light switches and luminaires Positioned and fixed each securely +- 5 mm from given dimension 2 x light switches (1 mark each) *(Note that switch AB position is dependent on the conduit double set being accurate)* luminaires specified distance from wall (1 mark for both)		☐	☐	☐
Installed switches level (1 mark) Installed sockets level (1 mark) Installed fire performance cable level where relevant with continual appropriate bend radius (1 mark)		☐	☐	☐
Cable clipping and conduit saddles Installed clips/saddles equidistantly/neatly and appropriately for the: ring final circuit (1 mark), lighting circuit (1 mark), smoke alarm circuit (1 mark)		☐	☐	☐
Section B: Connection and termination				
		Marks		
The learner has		**1**	**2**	**3**
Fire performance cable Glanded cable correctly (2 x glands) (1 mark each (2 max)) Clipped appropriately with no damage (1 mark)		☐	☐	☐
Socket outlets and smoke alarm Given sufficient cable slack and terminated conductors electrically and mechanically sound with no undue removal of cable insulation no damage. 2 x socket outlets (1 mark each) 1 x smoke alarm (1 mark)		☐	☐	☐
Light switches and luminaires Given sufficient cable slack and terminated conductors electrically and mechanically sound with no undue removal of cable insulation, no damage. light outlet A and B (1 mark) 2 x switches (1 mark each)		☐	☐	☐

Consumer unit Installed and terminated all cables/conductors correctly at the CU using where appropriate corresponding N and E bar sequence to CU ways. Lighting circuit (1 mark), ring final circuit (1 mark), smoke alarm circuit (1 mark)	☐	☐	☐

Section C: Health and safety

Key points

- PPE must be worn as per centre's own risk assessment (e.g. safety glasses and safety boots)
- Tidy work area

If there is a minor infringement, deduct marks as listed.

No minor infringement (3 marks), 1-2 minor infringements (2 marks), 3 minor infringements (1 mark), 4+ minor infringements and assessment is stopped, and the learner is referred.

The assessment must be stopped immediately if there is a major infringement of health and safety, which would also be classed as a fail.

		Marks		
The learner has		**1**	**2**	**3**
Kept a clean and tidy work area		☐ 3	☐ 1-2	☐ None
Worn PPE as required		☐ 3	☐ 1-2	☐ None

Warnings should be issued where learners are working unsafely and putting themselves and/or others at risk. Assessor to record infringement(s):

Section D: PVC Conduit				
		Marks		
The learner has		**1**	**2**	**3**
PVC Conduit lighting circuit Produced 2 x ripple free bends to ceiling (1 mark for each bend) Conduit connected into all accessories securely (push fit) (1 mark)		☐	☐	☐
PVC Conduit lighting circuit Produced ripple free double set to switch AB (2 marks) (award 1 mark if coupler used to achieve accuracy) Luminaire outlets A and B in line/straight, conduit vertically/horizontally correct (1 mark)		☐	☐	☐
PVC Conduit ring final circuit Produced ripple free set over obstruction (1 mark) Produced a straight set over obstruction (1 mark), Conduit connected into all accessories securely (push fit) (1 mark)		☐	☐	☐
PVC Conduit ring final circuit Achieved a clearance over obstruction with tolerance of:		☐ +/-10mm	☐ +/-7m	☐ +/-5mm
Section E: Circuits				
		Marks		
The learner has		**1**	**2**	**3**
Lighting circuit Wired the lighting circuit correctly so that: switches A provide 2-way control for luminaire A correctly (2 marks) switch B controls luminaire B correctly (1 mark)		☐	☐	☐
Wired ring final circuit correctly (1 mark) Wired smoke alarm correctly (1 mark) CPCs installed (1 mark)		☐	☐	☐
Cables and protective devices Lighting circuit: used appropriate rating of CB and stated conductor size (1 mark) Ring final circuit: CB rating and minimum conductor size as per standard circuit arrangement (IET On-Site Guide) (1 mark) Smoke alarm circuit: used stated rating of CB and conductor size (1 mark)		☐	☐	☐

Section F: Material usage				
		Marks		
The learner has		**1**	**2**	**3**
Requested no additional materials due to wastage		☐ 2 requests	☐ 1 request	☐ No extra requested
Section G: Testing				
		Marks		
The learner has		**1**	N/A	N/A
Carried out continuity of CPC testing		☐		
Carried out test for continuity of ring final circuit		☐		
Carried out IR testing		☐		
Carried out polarity testing		☐		
Recorded results		☐		
Results acceptable		☐		
Sub-totals		/24	/36	/54
Overall Total				/60

Performance marking grid

Task 3 **Section A: Positioning and fixing**				
		Marks		
The learner has		**1**	**2**	**3**
Socket outlets and box 1 Positioned and fixed each point securely +- 5 mm from given dimension 2 x socket outlets (1 mark each) 1 x box 1 (1 mark)		☐	☐	☐
Installed sockets level (1 mark) Installed SWA cable level where relevant with continual appropriate bend radius (1 mark) Installed SY cable vertically correct (1 mark)		☐	☐	☐
Cable fixing and conduit saddles Installed clips/saddles/cable ties equidistantly/neatly and appropriately for the: Steel conduit (1 mark), SWA (1 mark), SY (1 mark)		☐	☐	☐
Section B: Connection and termination				
		Marks		
The learner has		**1**	**2**	**3**
SY Cable Glanded cable securely using correct components (Award 1 mark if only one end made of correctly)		☐	N/A	☐
SWA Cable Glanded cable securely using correct components (2 x glands) (1 mark each) used banjo and CPC tail (1 mark)		☐	☐	☐
Socket outlets, SFCU Given sufficient cable slack and terminated conductors electrically and mechanically sound with no undue removal of cable insulation no damage. 2 x socket outlets (1 mark each) 1 x SFCU (1 mark)		☐	☐	☐
Consumer unit Installed and terminated all cables/conductors correctly. Connected the outgoing circuits in the correct sequence (CB, N and E bars). SSO circuit (2 marks) circuit to SFCU (1 mark)		☐	☐	☐

Section C: Health and safety

Key points

- PPE must be worn as per centre's own risk assessment (e.g. safety glasses and safety boots)
- Tidy work area

If there is a minor infringement, deduct marks as listed.

No minor infringement (3 marks), 1-2 minor infringements (2 marks), 3 minor infringements (1 mark), 4+ minor infringements and assessment is stopped, and the learner is referred.

The assessment must be stopped immediately if there is a major infringement of health and safety, which would also be classed as a fail.

		Marks		
The learner has		**1**	**2**	**3**
Kept a clean and tidy work area		☐ 3	☐ 1-2	☐ None
Worn PPE as required		☐ 3	☐ 1-2	☐ None

Warnings should be issued where learners are working unsafely and putting themselves and/or others at risk. Assessor to record infringement(s):

Section D: Trunking and conduit				
		Marks		
The learner has		**1**	**2**	**3**
Steel conduit Installed horizontally/vertically correct where relevant (1 mark) Conduit connected securely (1 mark) Deburred conduit (1 mark)		☐	☐	☐
Steel conduit Produced set in with tolerance of: (1 mark only awarded if running coupler is used to achieve accuracy)		☐ +-15 mm (or if running coupler used)	☐ +- 10 mm	☐ +-5 mm
Steel tray Sweeping bend: Installed horizontally and vertically correct (3 marks) Installed horizontally OR vertically correct (1 mark)		☐	N/A	☐
Steel tray Files all edges smooth/no sharp edges or burrs (2 mark) **Bend** bolted securely and correctly with round headed bolts (1 mark)		☐	☐	☐
Steel tray Continuous flange around set with any gaps no larger than:		☐ 10 mm	☐ 8 mm	☐ 5 mm
Steel tray Tray securely fixed to brackets correctly with round headed bolts (1 mark) Tray brackets secure to surface and level (2 marks)		☐	☐	☐
Section E: Circuits				
		Marks		
The learner has		**1**	**2**	**3**
Wired ring final circuit correctly (2 marks) Wired circuit to SFCU correctly (1 mark)		☐	☐	☐
Cables and protective devices Ring final circuit (PVC single core cables in conduit): CB rating and minimum conductor size as per standard circuit arrangement (IET On-Site Guide) (1 mark) Radial final circuit (SWA) to the SFCU: Used stated rating of CB and conductor size (1 mark) Used stated conductor size for the SY cable, and suitable minimal rating of fuse (5 A) in SFCU (1 mark)		☐	☐	☐

Section F: Material usage				
		Marks		
The learner has		**1**	**2**	**3**
Requested no additional materials due to wastage		☐ 2 requests	☐ 1 request	☐ No extra requested
Section G: Testing				
		Marks		
The learner has		**1**	N/A	N/A
Carried out continuity of CPC testing		☐		
Carried out test for continuity of ring final circuit		☐		
Carried out IR testing (all circuits)		☐		
Carried out polarity testing		☐		
Recorded results		☐		
Results acceptable		☐		
Sub-totals		/24	/32	/54
Overall Total				/60

Evaluation marking grid

Learner name:	
Assessment date:	

Evaluate completed work against the task brief, plan and success criteria	**Mark achieved**
• does not produce a **coherent** evaluation • does not reflect in an evaluative report the main outcomes of the project	**0**
or	
• produced a **coherent** evaluation • reflects on their own performance in an evaluative report of the **main outcomes** of the project tasks	**1**
or	
• produced a **coherent and considered** evaluation • describes in the evaluative report their **performance against their plan, success criteria and the task requirements** covering the **main activities and outcomes for all tasks**	**2**
or	
• produced an **extensive comprehensive** evaluation • **evaluates fully** in a well written evaluative report **their performance against their plan, success criteria and the task requirements** demonstrating their **own strengths/weaknesses and lessons learnt**	**3**
Mark achieved	
Total = Mark achieved × 14	**/42**

Marks within the evaluation section of the Practical Project, are to be multiplied by 14 to create the total marks for this section of the project.

Overall Practical Project mark

This table indicates the total marks available within each section of the practical project and the minimum mark which must be gained within each section.

Project Section	Marks Available	Marks Awarded	Threshold Pass Mark
Planning (highest scoring plan)	90		30
Trade Task 1	60		24
Trade Task 2	60		24
Trade Task 3	60		24
Evaluating	42		14
Total	312		116

Assessor Name: _____ Learner name: _____

Assessor signature: _____ Date: _____

Marks awarded within each section must be totalled and combined to create and overall project mark, the table below indicates the grade to be awarded based on the learner's overall mark.

Please note: the threshold pass mark indicates the minimum score that learners must achieve in each section of the project, but does not set the minimum score which must be achieved overall – the total mark required to pass this assessment can be found in the table below.

Determining overall grade

The table below identifies how many marks overall are required to achieve each grade within this assessment component:

Total Mark	Grade	Points
0 - 115	Fail	0
116 - 143	P1	1
144 - 171	P2	2
172 - 199	M1	3
200 - 227	M2	4
228 - 255	D1	5
256 - 283	D2	6
284 - 312	D3	7

The assessor must use this table to calculate a provisional grade for the learner. Notification of this provisional grade must be given to the learner within one week of completion of the assessment, with guidance given on the provisional nature of the grade. Provisional results will be subject to internal quality assurance procedures, followed by external quality assurance activity completed by EAL. Results will be submitted to EAL and the final assessment grade aggregated with the other assessment methods to award an overall qualification grade, which will be issued by EAL.

Practical Project provisional grade

Learner name	
Date	
Total mark achieved	
Provisional Practical Project Grade	
Assessor name	
Assessor signature	