

T Level Technical Qualification in Building Services Engineering for Construction

**Air conditioning engineering (8710-38)
(351)**

Candidate pack

Practical Assignment 2020 – Sample

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1. Assessment

This assessment is for the air conditioning engineering occupational specialism component of the Technical Qualification. This pack consists of a practical assignment that includes a project brief including drawing and diagrams as necessary along with several tasks for you to complete.

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2. Candidate guidance

General guidance

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

Plagiarism

This is an assessment of your abilities, so the work must be all your own work and carried out under the conditions stated. You will be asked to sign a declaration that you have not had any help with the assignment.

Your tutor is allowed to give you some help understanding the instructions, if necessary, but they will record any other guidance you need, and this will be taken into account during marking.

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

Where research is allowed, your tutor must be able to identify which work you have done yourself, and what you have found from other sources. It is therefore important to make sure you acknowledge sources used and clearly reference any information taken from them.

Timings and planning

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

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

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

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

If you have a good reason for needing more time, you will need to explain the reasons to your tutor, and this must be agreed by City & Guilds.

Health and Safety

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

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

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

Presentation of work

Presentation of work must be appropriate to the task.

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

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

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

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

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

Instructions for this assignment

Ensure you read all the provided assessment information contained in this candidate pack

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

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

Internet access is not allowed.

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

This assessment booklet contains:

- An assignment brief
- Task 1
- Task 2
- Task 3
- Task 4

Within each task you will find the following:

Conditions of assessment: This will tell you the duration and rules you must follow when completing a task.

What must be produced for marking: This describes the evidence you must submit when the task is completed. Be aware failure to submit any evidence requested can adversely affect your overall mark for the assessment

Additional evidence for this task: This describes other forms of evidence that will be collected by the assessor to support the marking of your performance. This will often include but not limited to photographic and video evidence

3. Assignment Brief

You have been called to a commercial property to undertake the design of an air conditioning system for a large office space (**figure 1**) followed by the planning and installation of a 2-3KW cooling capacity air conditioning system in a small office.

Your supervisor has asked you to carry out a survey of the proposed installation

The customer has identified the wall space that they want to locate the indoor unit on and the outdoor area to site the outdoor unit.

The general layout of the installation is shown in **figure 2**.

The power supply will be taken from a local isolator provided by others.

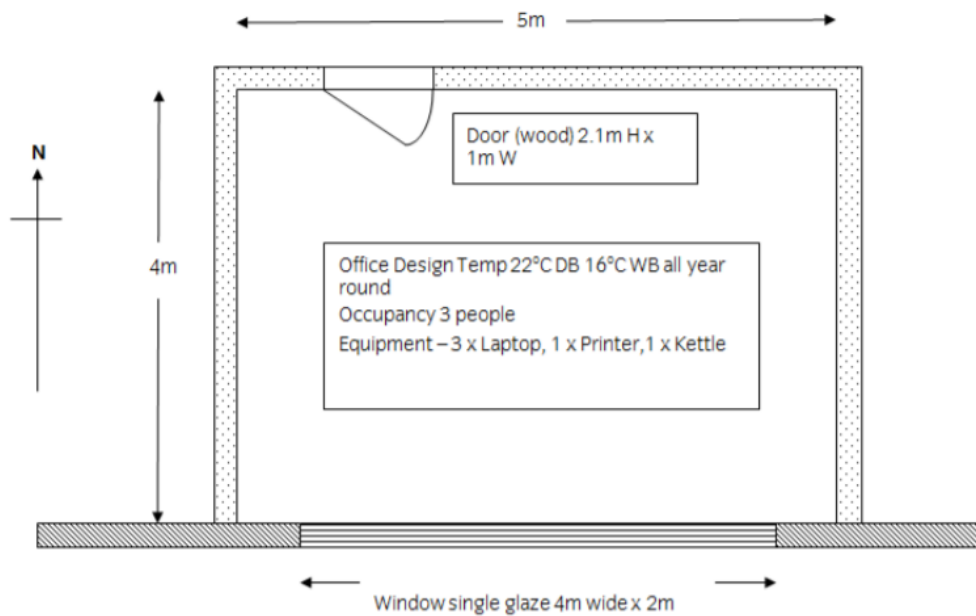
Condensate drainage will be connected to the main drain line provided by others.

Your supervisor will notify you of the requirements of the installation and a plan of the proposed space and location of existing services where you will carry out the installation.

Whilst on site the customer asked for an inspection of a faulty air conditioning heat pump unit. After inspection you are required to carry out a service and maintenance operation to rectify the system. You are required to discuss this with the customer and agree to carry out this work.

This assignment has a time of 28 hours. Plan your time accordingly to enable timely completion

Figure 1



Room design specification

Design Temperatures

Outside ambient = 32°C

Internal surrounding temperature (walls/ floor/ceiling) = 25°C

U values

External wall = 0.52 W/m²K

Internal wall = 1.7 W/m²K

Window = 4.8 W/m²K

Door = 3.2 W/m²K

Floor/Ceiling = 2.25 W/m²K

(Internal room height is 3.2m)

Outside Air Infiltration rate = 1.0

Solar gain

Window has transmittance factor of 0.9

Occupancy

Laptop computer = 500W

Printer = 750W

Kettle = 1kW

Lighting

50

Figure 2 Split air conditioning installation layout

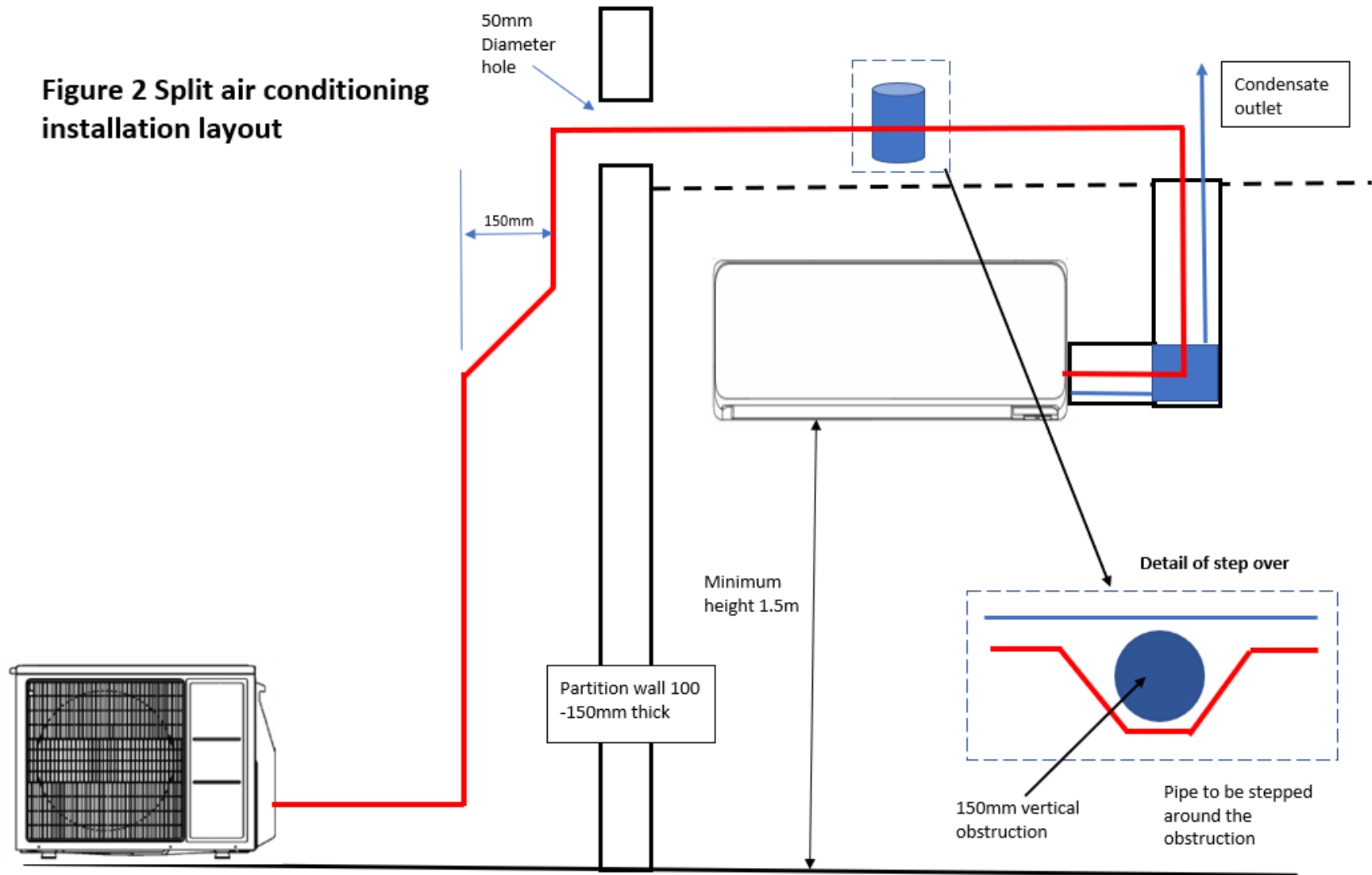


Figure 4 – Occupation data

Table 6.3 Typical rates at which heat is given off by human beings in different states of activity.

Degree of activity	Typical building	Total rate of heat emission for adult male / W	Rate of heat emission for mixture of males and females / W			Percentage of sensible heat that is radiant heat for stated air movement / %	
			Total	Sensible	Latent	High	Low
Seated at theatre	Theatre, cinema (matinee)	115	95	65	30	—	—
Seated at theatre, night	Theatre, cinema (night)	115	105	70	35	60	27
Seated, very light work	Offices, hotels, apartments	130	115	70	45	—	—
Moderate office work	Offices, hotels, apartments	140	130	75	55	—	—
Standing, light work; walking	Department store, retail store	160	130	75	55	58	38
Walking; standing	Bank	160	145	75	70	—	—
Sedentary work	Restaurant	145	160	80	80	—	—
Light bench work	Factory	235	220	80	140	—	—
Moderate dancing	Dance hall	265	250	90	160	49	35
Walking; light machine work	Factory	295	295	110	185	—	—
Bowling	Bowling alley	440	425	170	255	—	—
Heavy work	Factory	440	425	170	255	54	19
Heavy machine work; lifting	Factory	470	470	185	285	—	—
Athletics	Gymnasium	585	525	210	315	—	—

Source: ASHRAE Handbook: *Fundamentals* (2001)⁽⁶⁾

4. Tasks

Task 1 – Design

Using the office floor plan in **figure 1** and specification provided including both solar data (**figure 3**) and occupation data (**figure 4**) charts. You have been asked to calculate the summer heat gain in kW for June between 12-1pm for the office.

You need to determine:

- a) heat ingress through walls
- b) solar gain
- c) internal occupancy heat loads

Conditions of assessment:

- The time allocated for this task is 3 hours
- You must carry out the task on your own, under controlled conditions

What must be produced for marking:

- Completed calculations showing all workings

Task 2 – Planning the installation

Your assessor will provide you with a specific working area and a drawing template to ensure the dimensions meet the centre's resources. You must ensure the drawing is applicable to the location you are being assessed in and all plans are to a suitable scale.

- a) Plan the installation of the air conditioning system as per the brief given **figure 2**.
- b) Measure and mark out work area as detailed in your plan

Conditions of assessment:

- The time allocated for this task is 3 hours
- You must carry out the task on your own, under controlled conditions

What must be produced for marking:

- Risk assessment
- Method statement with justifications

- Installation drawing of proposed working area
- Materials list

Additional evidence for this task:

- Assessor observation of measurements and marking out of space allocation/ work area checked against installation drawing

Task 3 – Install and Commission

- a) Carry out the installation of the air conditioning system in accordance with your drawing and as agreed by your assessor.
- b) All pipework is to be pressure tested (strength and tightness)
- c) Safely isolate the system then connect the electrical supply and interconnecting wiring to the air conditioning system and condensate pump from a suitably supplied electrical isolator.
- d) Upon successful completion of pressure and leak testing, commission the system as per manufacturer's instructions and handover.

Conditions of assessment:

- The time allocated for this task is 15 hours
- You must carry out the task on your own, under controlled conditions

What must be produced for marking:

- Completed installation
- Pressure test certificate
- Commissioning checklist
- Handover the system to the client

Additional evidence of this task:

Assessor observations:

- Safe isolation
- Installation of systems and components
- Commission and handover system

Photographic evidence: the installation of the system, safe isolation, commissioning and handover.

Task 4 – Service and maintenance

Your assessor will provide you with three compressors

- a) Diagnose faults on each of the compressors
- b) Safely isolate then remove and refit a compressor from a designated charged condensing unit as directed by the assessor
- c) Conduct routine maintenance of a heat pump system and handover
- d) Produce a maintenance report including justifications for the work carried out

What must be produced for marking:

- Completed repair of the faults
- A report covering the service and maintenance that has been carried out with justification for methods used
- F-Gas log sheet, waste transfer note, pressure test certificate

Conditions of assessment:

- The time allocated for this task is 8 hours
- You must carry out the task on your own, under controlled conditions

Additional evidence for this task:

Assessor observation:

- Fault diagnosis
- Decommissioning
- Safe isolation
- Fault rectification

End of Assessment

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