T Level Technical Qualification in Design and Development for Engineering and Manufacturing (Level 3)

Electrical and Electronic Engineering Occupational Specialism (8714-33)

Practical Assignment

Candidate Pack (Sample)

September 2025 Version 3.0

Contents

Version and date	Change detail	Section
V1.0 June 2023	Approved version	n/a
V2.0 January 2023	Correction of lux value	Design criteria
V3.0 September 2025	Refinement of layout and formatting Removal of any duplicated information Candidate guidance, Brief and Tasks amalgamated into one document	All

1. Assessment

This assessment is for the Electrical and Electronic Engineering Occupational Specialism component of the Technical Qualification. This pack consists of a practical assignment brief, including drawings and diagrams as necessary, that you will need to use to complete your assessment tasks.

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 work you produce. It is therefore important that you carry your work out to the highest standard you can.

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 assessor 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.

Plagiarism
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 assignment.

This assignment is an assessment of your abilities, so the work submitted must be all your own 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 assessor is allowed to give you general advice, such as, clarification of the task instructions. However, general advice will not include:

- any specific advice on how to improve work to meet the required standard
- feedback on anything missing from your work
- any intervention that improves the standard or presentation of work

If there is a need to provide more than general advice your assessor will need to record the advice, they have given and take it into account when marking the submitted work.

Where research is allowed, your assessor must be able to identify which parts of the work you have done yourself, and what you have found from other sources. It is therefore important to make sure you acknowledge the sources you used and clearly reference any information taken from them (e.g. providing as a minimum a list of web addresses, books, articles etc that you used).

Use of Artificial Intelligence (AI)
AI may only be used as a source where the use of the internet is allowed for a research task. Where you use AI, you must acknowledge its use and show clearly how you have used it. Please be aware that how you have decided to use it may impact on the overall mark you are allocated.

Guidance and feedback
There are some rules around how much guidance and feedback your assessor can provide as part of completing the assignment. Your assessor is allowed to give you some help in understanding the task instructions if necessary. However, if significant clarification and guidance is provided by your assessor this will be recorded and considered as part of the marking process and may reduce your mark. Your assessor will make it clear if any guidance given may reduce your mark before it is given, so that you understand this when asking for guidance.

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

You should check with your assessor 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 appropriately divided the time available between parts of the assignment tasks. 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 assessor and agree a new time for the assessment to take place. Any changes will be at the discretion of the assessor and agreed to by City & Guilds.

Word counts
Typical word counts, where indicated, are to be used as approximates for guidance to support the production of sufficient evidence. The marking will relate to the quality of the evidence produced and not whether the word count has been met.

Submission of evidence
Your work will be submitted as final at the end of each assessment session. You will not have an opportunity to rework any of your evidence once the assessment session ends. However, if through other tasks within the project, you develop your ideas or build on earlier tasks, then you should continue to build on these and should use your evaluation to outline the reasons why this happened.

Presentation of work
The presentation of your work must be neat, legible and appropriate to the task and evidence required for submission.

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

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

Written work may be digital or handwritten unless stated otherwise.

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

Calculations should be set out clearly, showing all working and any assumptions you 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 issued by the assessor

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

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

Internet access is **not** allowed, unless otherwise stated in the task.

You will not be permitted any additional notes, such as printed resources and textbooks, unless otherwise stated in the conditions for assessment.

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

This assessment booklet contains the assignment brief.

The tasks have been separated into individual documents which will be handed to you at the start of each task.

Any additional documents/templates needed for the task will be provided to you by the assessor.

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.
- **Controlled conditions:** This will tell you the rules you must follow when completing each task. For example, you must not share or discuss your work with other candidates.
- **What must be produced for marking:** This describes the evidence you must submit when the task is completed. Be aware that 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 is not limited to, photographic and video evidence.
- **Resources:** Provides a list of equipment, documents or tools that you will have access to, to complete the task/sub task.

3. Assignment brief

You are a control and instrumentation engineer employed by an industrial food production company that supplies its products to supermarkets. The company grows food bearing plants in large indoor facilities, such as that shown in Figure 1.

In order to grow properly, the plants must be provided with enough artificial light and be kept at the correct temperature at all times. If this does not happen, the resulting products will not meet the needs of the customer and will have to be thrown away.

Figure 1

https://www.forbes.com/sites/erikkobayashisolomon/2019/04/05/investing-in-vertical-farming-five-take-aways/?sh=318590b3355c

You have been asked to design, develop and test a prototype for a control system that will maintain the correct lighting and temperature levels for one of the company's facilities. If the design is successful, it will be used across all of the company's food growing facilities.

The system must meet the needs of the design criteria given below as a minimum requirement.

Design Criteria

The design criteria for this application are:

- the system must be stable and capable of automatically regulating a temperature within a range of 18°C – 24°C
- the temperature control system must not exceed three overshoots on first switching on from a 30°C start
- a pre alarm must sound when the temperature is nearing the range limits
- the system must provide a visual output showing the temperature and light level measurements in real time
- the system must be able to record parameters relevant to its operation
- the system must be able to change the desired temperature range and light level to suit different produce
- the system must be able to detect when the light level, above the produce, is below 10,000 lux.

This assignment has a time allocation of **34 hours**.

4. Tasks

Task 1 - Design

You must:

a) produce a detailed design specification that builds on the design criteria given in the assignment brief, including any references to research used. The specification should include:
   - a definition of the operating limits of the system
   - an analysis of how system stability will be achieved

b) generate a suitable design for the control system, including:
   - annotated sketches, block and wiring diagrams for the system that show how it will function
   - selection of appropriate sensors with justifications, and all relevant calculations
   - selection of appropriate pre alarm temperatures with justifications and all relevant calculations. (The exact position of the pre alarm range limits will be determined by the design of your system)

c) produce a virtual model of the proposed design using appropriate software

d) create a bill of materials (BoM) listing all of the parts required in your final design proposal.

Conditions of assessment:

- the time allocated for this task is **14 hours**
- you must carry out the task on your own, under **controlled conditions.**

Controlled conditions:

- you must only work on the tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed
- you must not share or discuss your work with other candidates
- you are not permitted to bring any materials into the assessment session.

What must be produced for marking:

- design specification
- annotated sketches, block and wiring diagrams
- design options for the sensors with justifications, and calculations
- selection of appropriate pre alarm temperatures with justifications and calculations, including all workings
- outcomes of the virtual modelling of the proposed system design, either as screen captures or printouts
- bill of materials

Additional evidence

- any notes produced of research undertaken including citation of sources and internet search history must be submitted to ensure the authenticity of evidence produced.

Resources:

- access to the internet for research purposes
- access to appropriate virtual modelling and CAD software
- manufacturer’s datasheets for component parts
- manufacturer’s instructions for component parts
- scientific calculator.

Task 2 – Manufacture and test

You must:

a) produce a risk assessment for the construction of the prototype
b) use a permanent construction method to construct the prototype
c) test and verify the operation of the completed prototype, recording your findings.

Conditions of assessment:

- the time allocated for this task is **13 hours**
- you must carry out the task on your own, under **controlled conditions**.

Controlled conditions:

- you must only work on the tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed
- you must not share or discuss your work with other candidates
- you are not permitted to bring any materials into the assessment session.

What must be produced for marking:

- risk assessment
- prototype
- test and verification records.

Additional evidence for this task:

- assessor observation of the construction of the prototype
- assessor observation of the testing and verification.

To support the comments made within the Practical Observation the assessor must capture the following photographs and videos that must be submitted as supporting evidence for each candidate.

Photographic evidence which shows:

- sequence of photos during the construction of the prototype to include:
  - results of tool selection and usage
  - wiring – dressing of cables
  - control hardware
  - interfaces
  - sub-assemblies
  - final prototype.

Video evidence which shows:

- functionality of the prototype (maximum of five minutes)

Resources:

- copies of completed documentation from Task 1
- appropriate materials, components and facilities to produce the prototype

- test environment
- appropriate test and verification equipment, such as multimeters, logic probes etc.

Task 3 – Peer review

As part of the development and design process it is critical that engineers can work constructively with others and consider feedback to inform designs to ensure they meet their purpose and requirements.

The assessor will set up the groups and make sure that you have access to copies of your design. You will present your design.

a) Prepare to present your design verbally using annotated sketches and diagrams.
b) Present and explain your design.
c) Peer reviewers will now have time to reflect on your design.
d) Discuss feedback from the group on your design presented in part b).
e) Peer reviewers will now complete the peer review feedback form.

Conditions of assessment:

- the time allocated for this task is **60 minutes**. This is broken down for the above tasks below:
  a) 10 minutes to prepare to present designs
  b) 10 minutes to present and explain designs
  c) 10 minutes for the peer review group to discuss and reflect on the design before providing feedback
  d) 15 minutes for the peer review group to discuss the design with you and ask you questions
  e) 15 minutes for the peer review group to provide collective feedback on the peer review form to submit to the assessor for approval
- the task must be supervised at all times
- you must use the feedback record form to make any notes and record any feedback to questions asked as part of the discussion. The peer group will also provide you with a Peer Review Form with feedback, which will have been checked for appropriateness by the assessor before being shared.

Controlled conditions:

- you must only work on the tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed by candidates
- you must not share or discuss your work or the work of others outside the assessment time
- you are not permitted to bring any materials into the assessment session.

For parts a), b) and d) **you** must:

- proactively participate in the discussion
- manage your time
- seeks any clarity in the feedback given and be prepared to ask questions
- record any feedback notes on the feedback record form provided.

For parts c), d) and e) **peer reviewers** must:

- proactively engage in the discussion
- respond constructively and fairly
- ensure the peer review feedback form is completed fully and handed to the assessor.

What must be submitted:

- feedback record form

- peer review feedback form.

Resources

- copies of completed documentation from Task 1
- feedback record form
- peer review feedback form(s).

Task 4 – Evaluation and implementation

You must:

a) produce a virtual model of the design using appropriate software incorporating any changes you have decided to make in response to feedback or as a result of manufacturing and testing

b) produce a revision control document or report that is typically 500 words justifying why changes were made or not made as a result of the peer review feedback

c) produce a report evaluating the proposed design. The report should typically be 800 words. This must include:

- an explanation of the test methods used and the reasons for their use and limitations
- an evaluation of the fitness for purpose of the design proposal and its conformance to the design criteria and specification
- the information necessary for a third party to implement their design, including commissioning procedures and health and safety considerations
- any further improvements or adaptations to the design, including any reasoning and justifications if adaptions or improvements are not required.

Conditions of assessment:

- the time allocated for this task is **6 hours**
- you must carry out the task on your own, under **controlled conditions.**

Controlled conditions:

- you must only work on the tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed
- you must not share or discuss your work with other candidates
- you are not permitted to bring any materials into the assessment session.

What must be produced for marking:

- outcomes of virtual modelling
- revision control document
- evaluation and implementation report.

Resources:

- copies of completed documentation from Tasks 1 and 2
- feedback record form and peer review form from Task 3.
- Internet access for research (e.g. costs, component data and production information)
- manufacturer's datasheets (for materials and components)

End of assessment

The T Level is a qualification approved and managed by the Institute for Apprenticeships and Technical Education.