T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Engineering, Manufacturing, Process and Control (8713-34)

Fabrication and Welding Technologies (334)

Practical Assignment

Sample Assessor Pack

First teaching from September 2022
Version 1.0

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Contents

1. Assessment

The assessment for this component consists of a practical assignment that includes an assignment brief and then a number of tasks for the candidate to complete. Tasks are assessed by assessment themes that cover a range of knowledge and skills from the performance outcomes. They are designed to allow judgement of the candidate to be made across different categories of performance.

The assessment for this component has been allocated a set number of marks against each assessment theme, based on weightings recommended by stakeholders of the qualification. This mark allocation remains the same for all versions of the assessments, ensuring consistency across assessment versions and over time.

Performance outcomes

The weightings for each performance outcome will remain the same for every version of the practical assignment. This ensures the appropriate depth and breadth of knowledge and skills for each specialism can be reliably assessed in every version and meets the needs of industry while keeping comparability between each assessment over time.

Performance outcome	Typical knowledge and skills	Weighting
PO2 Analyse the tasks, projects and specifications, considering the specific processing requirements, context, resources, materials, tools and equipment, and the suitability of different fabrication and welding technologies, methods and processes.	Interpret requirements of a brief through the analysis and interrogation of available information sources and formats. Consider all relevant aspects of a brief challenging and confirming expectations including risks and issues. Select and use techniques, processes and technologies that will assist in the analysis of information available.	13%
PO3 Plan and prepare the relevant processes, tools, equipment, and resources, needed to produce relevant materials and products.	Plans to meet the requirements of a brief effectively with consideration of required resources and technology. Identify and mitigate potential issues prior to the fabrication activity. Check materials conform to specification. Prepare the work area including required tools and equipment for fabricating products. Measure and mark out components to specification and plan for wastage and disposal.	19%
PO4 Produce the relevant product considering the specified requirements and raw materials using the relevant fabrication and welding process and method.	Use measurement techniques, tools and equipment safely and efficiently. Accurately cut,shape and drill products using cutting, forging, fabrication and welding techniques. Use effective joining and bonding techniques and equipment. Assembly all components to produce the final fabricated product.	35%
PO5 Support the delivery (and the management) of relevant fabrication and welding projects and activities, helping to evaluate and review processes and outcomes, and to improve practices.	Evaluate conditions and processes to support selection and application of specific materials. Carry out quality monitoring and assurance checks on fabricated product. Use non-destructive testing methods. Deal with issues and problems quickly and efficiently, escalate issues in line with correct lines of reporting. Monitor work to ensure efficiency, and safety at all times.	21%
PO6 Communicate production information, proposals and solutions, producing, recording and explaining relevant technical information, representations, processes and outcomes.	Use different techniques to communicate technical information effectively with consideration of audience and format. Produce technical documentation using available tools and technology, accurately recording information, data and risks as part of handover of the process to client/end user.	12%

Grade descriptors

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

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

Adequately prepare working areas, acknowledging potential risks and applying acceptable housekeeping techniques during tasks.

Demonstrate basic technical practical skills in marking out, cutting, forging, fabricating, welding that is in line with industry standards and meet the requirements of the brief.

Demonstrate basic knowledge and understanding of the principles and processes required for fabrication and welding technologies.

Work safely showing an understanding in the selection and use of relevant tools and equipment and demonstrate a basic awareness of straightforward preparation and application processes within the working environments for marking out, cutting, forging, fabricating and welding activities.

Identify causes of problems or common issues related to fabrication and welding and have some knowledge and skills in how to rectify them.

Demonstrate basic technical skills and understanding in the use of non-destructive testing methods to ensure quality welds are produced to recognised industry standards.

Mostly use general industry and technical terminology accurately across different communication methods with some consideration of technical and non-technical audiences.

To achieve a distinction, a candidate will typically be able to:

Competently and thoroughly interpret technical information, applying technical skills to plan, assess risk and follow safe working methods to practical tasks and procedures to an exemplary standard in response to the requirements of the brief, producing an excellent quality of work that meets regulations and standards.

Thoroughly prepare working area, mitigating potential risks prior to commencing tasks and consistently apply exemplary housekeeping techniques during tasks.

Demonstrate exemplary technical practical skills in marking out, cutting, forging, fabricating and welding that is in line with industry standards and meet the requirements of the brief.

Demonstrate exemplary knowledge and understanding of the principles and processes required for fabrication and welding technologies.

Work safely and make informed and appropriate use of tools, materials and equipment within the working environments for marking out, cutting, forging, fabricating and welding activities.

Identify causes and diagnose problems or common issues related to fabrication and welding and have a thorough understanding and the skills to be able resolve and rectify them.

Demonstrate exemplary technical skills and understanding in the use of non-destructive testing methods to ensure quality welds are produced to recognised industry standards.

Consistently and accurately use industry and technical terminology across different communication methods with full consideration of technical and non-technical audiences.

2. Assignment brief

You are working as a fabrication engineer for a local company which fabricates many products including products for the marine industry.

You have been asked to plan out the required material and cut sizes, and then fabricate and weld an anchor for a customer's small boat.

The customer has supplied the overall size of the anchor required.

You are required to fabricate all parts of the anchor including the:

- stock
- crown
- shank
- flukes and support.

Once the anchor has been fabricated and welded you will have to test the integrity of your welds using a Non-Destructive Testing (NDT) method.

You will complete the assembly of the anchor by attaching the pre-fabricated chain and shackle.

You will evaluate the processes and procedures used to produce the finished anchor and present your findings to your supervisor in a handover meeting.

This assignment has a time allocation of **26 hours and 15 minutes.**

Design representation

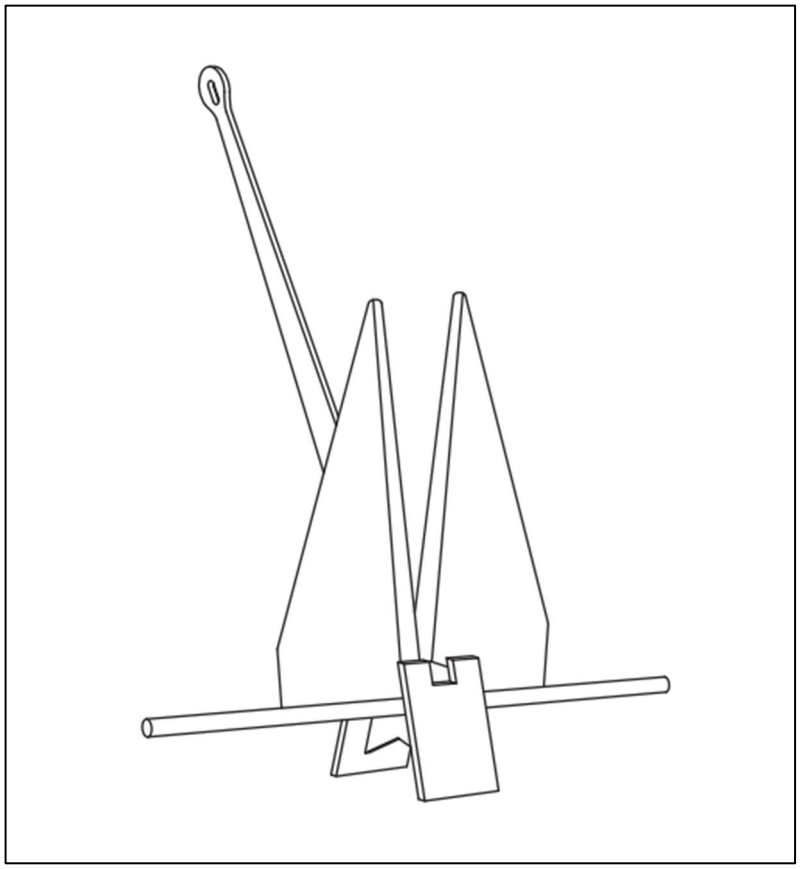
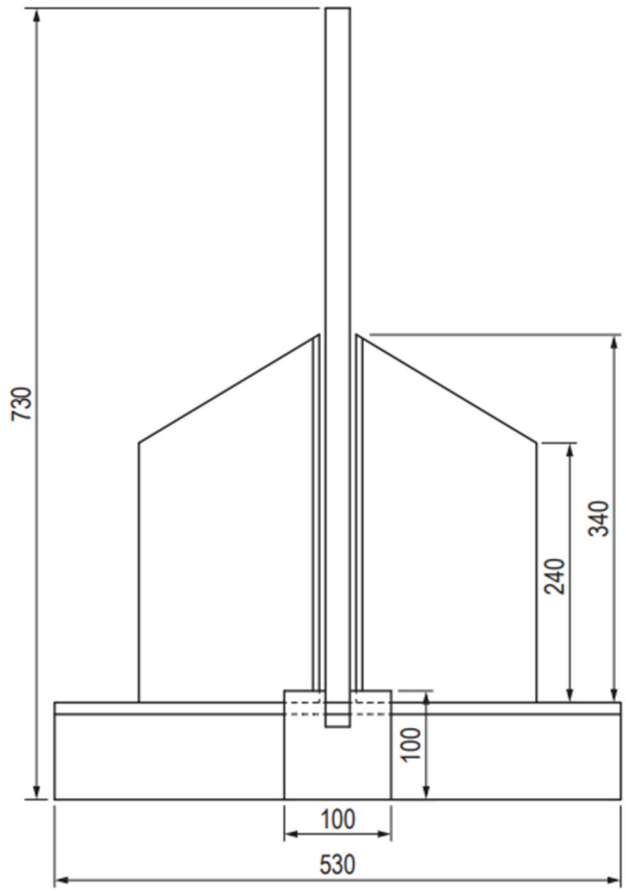


Figure 1: Fabrication design

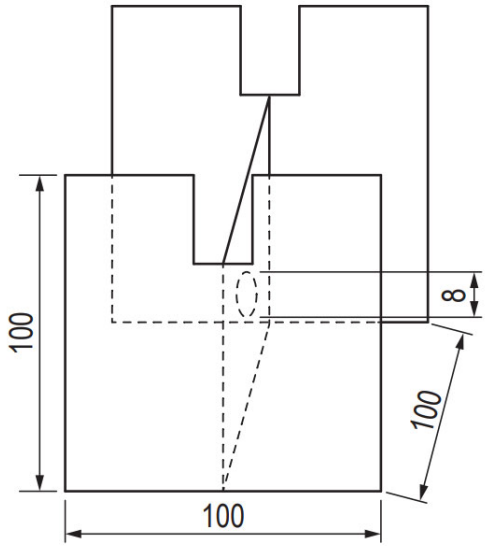


ALL MEASUREMENTS IN MM

DRAWING NOT TO SCALE

FINISH			DO NOT SCALE DRAWING	REVISION
	NAME	SIGNATURE	DATE	
				FABRICATION DESIGN

Figure 2: Crown



ALL MEASUREMENTS IN MM

DRAWING NOT TO SCALE

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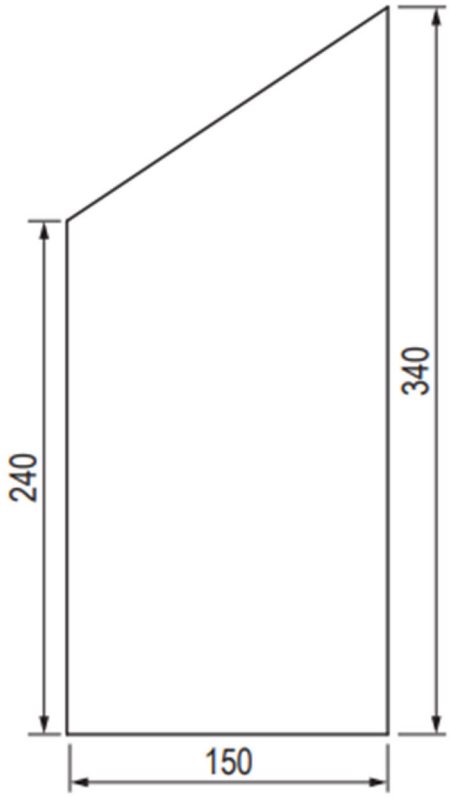
	NAME	SIGNATURE	DATE	
				CROWN

Figure 3: Flukes

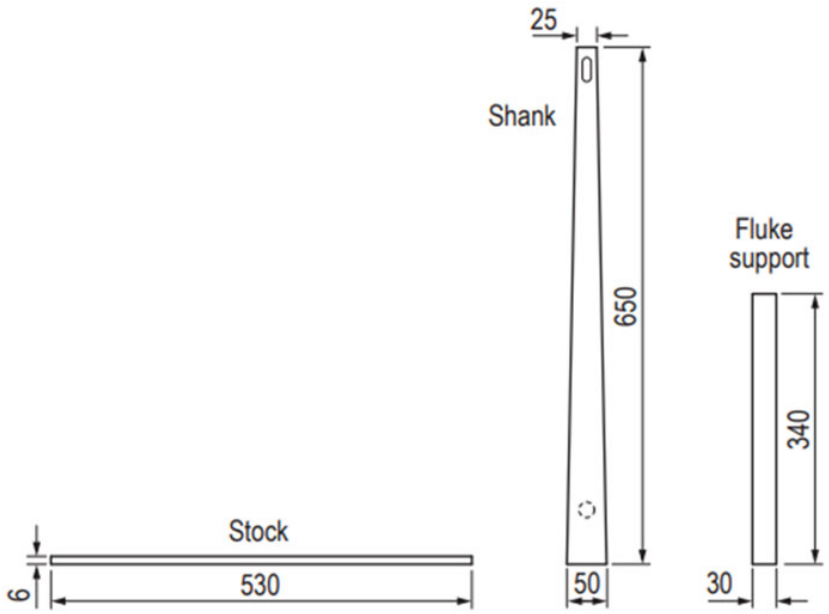


ALL MEASUREMENTS IN MM

DRAWING NOT TO SCALE

FINISH			DO NOT SCALE DRAWING	REVISION
	NAME	SIGNATURE	DATE	
				FLUKES

Figure 4: Stock, shank and fluke support



ALL MEASUREMENTS IN MM

DRAWING NOT TO SCALE

FINISH			DO NOT SCALE DRAWING	REVISION
	NAME	SIGNATURE	DATE	
				STOCK, SHANK AND FLUKE SUPPORT

Figure 5 - Fabrication criteria

Component	Measurement
Anchor height	730 mm.
Stock	530 mm x 6 mm round bar.
Crown	100 mm high x 100 mm wide at widest point.
Shank	650 mm x base width 50 mm to 25 mm at top.
Flukes and fluke support	340 mm overall height x 150 mm wide x 240 mm at shortest height side x 30-degree angle to meet top. Fluke support 340mm x base width 30 mm.
Hole and notch sizes	8mm hole for the round bar.
Pre-fabricated components	• Pin. • Shackle. • Chain.
Cutting equipment	To be selected from: • flame • plasma • laser • power nibblers • hand tools.
Welding processes	**Two** processes **must** be selected from: • TIG • MIG • MAG • MMA.
Welding positions	**Two** positions **must** be demonstrated from: • flat (PA) • horizontal (PC) • vertical up (PF).
Non-destructive testing method	Magnetic particle testing.
Industrial Standard	Welding **must** be produced to BS EN ISO 5817.

3. Tasks

General task guidance

Read **ALL** information carefully before the assessment.

Ensure you have read the following guidance before you undertake the assessment of candidates:

- T level technical qualifications – marking
- T level technical qualifications – moderation (updated annually)
- T level technical qualifications – teaching, learning and assessment
- Technical qualification guides on marking and moderation
- Practical Observation template
- Mark grids following the tasks below
- Feedback guidance for assessors.

All work carried out should be to industry standards, done in a safe manner and compliant with relevant regulations. If a candidate fails to carry out the activities in a safe manner, the assignment should be suspended until this aspect is corrected. Further guidance for assessors can be found in the centre guidance section under health and safety.

Photographs must be used to support the qualitative statements captured on the Practical Observation form. Details of specific photograph requirements are outlined in the task information below. Photographs must have the date and candidate's name attached so that they can be differentiated. The candidate does not need to be in the photograph, the purpose of the photograph is to demonstrate the quality and standards of work of specific activities and of the work throughout various stages of the assignment.

Time

The following timings are provided to support centre planning.

The time allocated for the completion of the tasks and production of evidence for this assessment is **26 hours and 15 minutes**. Timings for completion of specific tasks are outlined below.

- Task 1 – 3 hours
- Task 2 – 20 hours
- Task 3 – 3 hours and 15 minutes.

When working under supervised conditions for longer sessions, breaks can be facilitated outside of the controlled conditions, ensuring the room is locked and all candidates have vacated once the break begins. All materials must be kept securely during the break.

Scheduling assessment sessions

It is the centre's responsibility to arrange how time is managed to fit with timetables and meet the times allocated for each task during the assessment window. Assessment windows are specified in the key date schedule.

The tasks must be issued in order, one at a time to candidates by centres in the scheduled assessment times. Candidates are able to refer to the brief and scenario during all of the scheduled assessment time. Candidates are not permitted to return to tasks after the assessment time for the task has ended and the next task has begun. Candidates must not move on to the next task within the assessment session until instructed to do so by the assessor. It is the assessor's responsibility to ensure that all evidence for a task has been submitted before administering the next task. Candidates are not required to have formal reading time for the scenario and brief, this is included within the duration for Task 1.

When working under supervised conditions for longer sessions, breaks can be facilitated outside of the controlled conditions, ensuring the room is locked and all candidates have vacated once the break begins. All materials must be kept securely during the break.

Centres should aim to schedule tasks in the fewest amount of assessment sessions but ensure that the durations dictated for each task are covered. However, to aid deliverability and manageability of assessment, sessions can be split where there is a requirement. For example, where timetabling of an appropriate location for six hours is not possible, e.g. where centre's access to computer resources is limited, or where candidates are not available for six consecutive hours (e.g. due to work placement commitments). Where this is necessary, sessions must be timetabled over consecutive days and in as few sessions as possible. All assessment evidence must be stored securely and access to assessment materials and their work only given to candidates during the formal assessment times. All candidates are required to complete a declaration of authenticity along with their evidence submission, and the arrangements must support the assessor in being confident in confirming authenticity.

Where assessments need to be completed in a number of assessment sessions or over consecutive days all practical work areas and any evidence produced must be kept secure and must only be accessed by the assessor. Information and notices should be used to inform other users of the facility that no access will be granted when assessment sessions are in progress. Practical work areas, tools, equipment and systems for the assessment must not be reset until a candidate has completed the full assessment.

Internet access

Where internet access is allowed as part of a task (e.g. for research or report writing purposes) candidates must be advised that this is the case and reminded of the importance of submitting their own work and the seriousness of plagiarism, malpractice and collusion. Candidates should be advised that their browser history can be monitored and checked. Depending on the type of task candidates may be requested to submit their internet search history to be considered as part of the submission of evidence, in order to confirm the authenticity of submitted evidence.

Where candidates are allowed the use of computer equipment, but not the use of the internet for a task, equipment should be provided with internet capability disabled (e.g. Wi-Fi disabled, machine disconnected from network).

Resources

Candidates must have access to a suitable range of resources to carry out the tasks and, where appropriate, to have the opportunity to choose components, tools and equipment that demonstrate their ability to select from a range of appropriate materials.

Where candidates need access to evidence that has been submitted as part of a previous task, this will be provided as a copy of the original evidence and will be given at the start of the relevant task.

The candidate should have access to the following to select and carry out each task:

- general engineering hand tools (pliers, files)
- measuring and marking out equipment (tapes, callipers, rulers, T-squares, marking tool, gauges, calibration certificate)
- 6mm mild steel round bar
- 6mm mild steel plate
- 10 mm mild steel flat bar
- mild steel chain (pre-fabricated)
- shackle (pre-fabricated)
- pin (pre-fabricated)
- Personal Protective Equipment (PPE) (auto-darkening welding helmet, air-fed welding helmet, welding jacket or apron, welding shoes/boots, gloves, safety glasses, ear plugs or ear defenders, mask or respirator)
- abrasive equipment (files, angle grinder, grinding discs, wire brush)
- cutting equipment (flame, plasma, laser, power nibblers, hand tools, workshop saws)
- welding processes: **two** to be utilised from TIG, MIG, MAG, MMA
- welding equipment clamps, welding table, welding magnets, electrodes, wire or electrode feed)
- forging equipment (hammers, furnace or equivalent, tongs, clamping vice)
- drilling equipment (pillar drill, power tool, bits, chucks)
- magnetic particle testing equipment (electromagnetic yoke, magnetic dry powder, powder bulb and blower, aerosol solvent cleaner, wire brush, welding magnifying glass)
- cleaning products
- manufacturer's manuals
- COSHH data sheets
- technical drawings
- generic hot works permit to work form
- writing materials
- access to a computer to produce the report.

The assessment area must also contain the following:

- workshops must be well ventilated and well lit
- safe lines for gas bottles for the cutting equipment and welding equipment
- benches or tables for each candidate
- a clock visible to all candidates
- storage area for part-done and finished pieces

- first aid kit and eye wash station
- waste disposal area.

Task specific guidance

Each task should be administered separately, and each task should be completed and submitted by all candidates before moving onto the next.

Resources are specified through centre resource list in advance of the assessment but will not be made available to students as this will lead students to know the tools and resources that they must select for themselves in Task 1. Candidates will have access to the workshop/tool cupboard to select resources rather than a list and the required resources are dictated by the guidance and brief.

Task 1

The purpose of this task is for the candidate to plan the work, considering the order the pieces need to be cut and fabricated in and what safety measures are required to complete the task safely.

Candidates must be provided with the technical drawings to allow them to complete this task.

Candidates must produce a resources list detailing all the resources they will need, including safety equipment. Candidates must also check measuring equipment for calibration and that it is fit for purpose. This must be recorded on their resources list as checked.

Candidates must produce a risk assessment and method statement including a list of the safety equipment required.

Candidates must complete a hot works permit. The assessor must check and countersign the hot works permit prior to candidates commencing Task 2. Candidates must be provided with a countersigned copy for subsequent tasks.

Candidates must produce a cutting list for the fabrication components by interpreting the engineering drawings provided, accurately measuring out the work cut sizes to ensure the pieces are correct in reference to the drawing. All hole and notch sizes to be determined by the candidate.

Candidates must be able to interpret the technical drawings and understand basic welding symbols and terminology.

Candidates must produce a quality check sheet for use in Task 3A, this should contain the quality checks to be made, dimensions of the components and additional space for the findings of the NDT testing to be recorded.

Task 2

Work area must be representative of normal centre practice prior to any practical activities taking place for candidates to complete their work area preparation.

Candidates must have access to the workshop/tool cupboard for any additional tools, equipment and components not previously selected in Task 1, which candidates are then able to annotate on their method statement with any changes to their original plans.

The purpose of this task is for the candidate to mark out each component from their cutting list (Task 1) onto the material provided. To be able to demonstrate adequate marking-out techniques and correct tool selection for the 'form of supply' and material selected, this should include working from datum edges, surfaces, lines or corners. Each piece must be placed in order of cutting. Candidates must set up and prepare their areas for work which includes ensuring there is adequate ventilation and correct PPE for using their chosen cutting equipment.

Each component piece must be cut to correct dimensions using the cutting device selected and then prepared for welding using suitable abrasive equipment. Candidates must drill a 8mm hole for the round bar and notch size on the crown to be determined by candidates.

Fabrication to include initial tack welds to secure in place, followed by fully welding the seams. Candidates must use two different welding processes and the crown and flukes must be welded in vertical position, for example, the vertical welds to be completed using MMA and MIG for the rest of the welds. The welds must be produced to BS EN ISO 5817 welding standard. The welds as a minimum should be 150mm long.

Candidates that do not utilise two different welding processes and/or demonstrate two different welding positions must be shown as a fail on the marking sheets and their assessment must be ended. They must retake the assessment in a future series after significant further training has taken place.

Candidates must check the completed fabrication against the engineering drawing to ensure all sizes have been checked, and fully squared up with stiffeners fitted. To avoid twisting of metal it needs to be fully welded in all the required parts.

Stock ends must be forged into rounded edge using a furnace or equivalent (e.g. oxy fuel equipment) and hammer.

The pre-fabricated chain must be attached to the anchor with the pre-fabricated shackle through the drilled hole in the end of the shank.

Task 3

Work area must be representative of normal centre practice prior to any practical activities taking place for candidates to complete their work area preparation.

Candidates must have access to the workshop/tool cupboard for any additional tools, equipment and components not previously selected in Task 1, which candidates are then able to annotate on their method statement with any changes to their original plans.

The purpose of this task is for the candidate to quality assure their work and to perform a non-destructive test on their fabricated anchor. Candidates must collate their findings and overall evaluations in a report. Candidates must perform a handover with their supervisor. This task is in three parts: a), b) and c).

a) Quality review and testing

Candidates must as a minimum perform both measurement and dimensional checks to all fabricated components, ensuring they meet the specified dimensions as per the engineering drawing.

Candidates must perform the NDT test to a minimum of three different selected welds using testing techniques including visual and magnetic particle testing. All test results must be recorded on the quality checklist created in Task 1.

b) Evaluation and recording

Candidates are also required to identify any faults or defects with the anchor including welds. Candidates must provide a narrative to explain why the defects have occurred and the measures needed to avoid their occurrence in future fabrication runs.

All findings must be recorded and presented in a suitable quality inspection report which must also include the candidate's suggestions for process improvements.

If candidates have self-corrected their method statement during the practical elements, they would be expected to justify why they didn't follow their plan as part of the report and during the handover.

Candidates must reference the appropriate standards that apply in their report, for example:

- BS EN ISO 5817 – Welding – Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections
- ISO 17638 Non-destructive testing of welds (MPI)
- ISO 9934-1 Non-destructive testing - Magnetic particle testing - Part 1. (General principles).

c) Handover

With the assessor present and the assessor (or another staff member) acting as the supervisor, candidates must demonstrate a typical handover.

Candidates must present their finished work with the quality inspection report to their supervisor, giving a summary of the findings of the report and explain any improvements that they have identified to processes, procedures or product design.

The presentation has been allocated 15 minutes. Assessors will need to schedule candidates time to give their feedback on completion of Task 3b.

This task should take place once Task 3b has ended. No additional preparation time is required as this is a handover exercise and the candidate will have just completed their report and should be able to highlight areas of the report, their findings and their ideas for potential improvements.

The assessor must not ask any questions or prompt the candidate at any point in this meeting. The meeting should be recorded on video for the assessor to refer back to when completing the Practical Observation form and submit as evidence. The video recording should be a maximum of 15 minutes.

Assessors are to record their observations of this presentation on their Practical Observation form.

Task 1 – Planning

Candidates must:

a) analyse the brief and technical information to produce a resources list needed for the production of the anchor
b) produce a risk assessment for the activities needed for the production of the anchor
c) produce a method statement with justifications for the production (fabrication, welding and testing) of the anchor
d) complete a hot works permit
e) carry out calibration checks on measurement equipment
f) produce a cutting list for the fabricated pieces
g) produce a quality check sheet for use in Task 3A.

Conditions of assessment:

- the time allocated for this task is **3 hours**
- candidates must carry out the task on their own, under **controlled conditions** while being observed
- candidates must have their hot works permit countersigned by their assessor before they can progress to task 2.

Controlled conditions:

- candidates must only work on their 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
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- where assessments need to be completed in a number of assessment sessions or over consecutive days all practical work areas and any evidence produced must be kept secure and must only be accessed by the assessor.

What must be produced for marking:

- a resources list with measuring equipment calibration check recorded
- a risk assessment
- a method statement with justifications
- a hot works permit (countersigned by assessor)
- a cutting list
- a quality check sheet.

Resources:

- writing materials
- measuring equipment (with calibration certificate)
- engineering drawings
- risk assessment generic template
- hot works generic template
- copies of industrial welding standards.

Task 2 – Production

Candidates must:

a) prepare the work area
b) mark out and cut components for the anchor using cutting equipment
c) prepare cut components for welding
d) fabricate the components using two different welding techniques and two different welding positions
e) forge the stock end
f) assemble the anchor
g) reinstate the work area.

Conditions of assessment:

- the time allocated for this task is **20 hours**
- candidates must carry out the task on their own, under **controlled conditions** while being observed
- candidates must follow safe systems of working at all times
- the hot work permit must have been checked and countersigned by the assessor prior to starting this task
- correct PPE must be worn at all times and as designated in their risk assessment (if unsafe working occurs the assessment must be stopped immediately).

Controlled conditions:

- candidates must only work on their 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
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- assessor observations must be carried out within the assessor to candidate ratio stipulated by City & Guilds
- where assessments need to be completed in a number of assessment sessions or over consecutive days all practical work areas and any evidence produced must be kept secure and must only be accessed by the assessor.

What must be produced for marking:

- fully fabricated and welded anchor consisting of:
    - stock
    - crown
    - shank
    - flukes and support
    - pre-fabricated shackle and chain attached.

Additional evidence for this task:

- assessor observation to include:
    - the work area, prior to, during and on completion of fabrication activities
    - preparation of tools and equipment
    - welding and tool skills
    - use of cutting list (noting any changes made)
    - production stages of anchor (marking out, cutting, welding preparation, welding, finishing and final assembly)
    - the application and use of tools and equipment
        - the use of two different welding processes
        - the use of two different welding techniques.

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

Photographic evidence which shows:

- the work area, prior to, during and on completion of fabrication activities
- marking out and use of measuring equipment
- cutting and preparation of cut components
- application of welding techniques, showing two different welding processes and two different welding positions
- the completed anchor (with the pre-fabricated shackle and chain attached).

Resources

- appropriate Personal Protective Equipment (PPE) (as per resources list)
- marking out tools
- hand tools (hammer, hand file)
- band saw
- abrasive equipment (files, angle grinder)
- cutting equipment (flame, plasma, laser, power nibblers, hand tools)
- welding equipment (two from TIG, MIG, MAG, MMA)
- forging equipment (hammers, furnace or equivalent, tongs, clamping vice)
- drilling equipment (pillar drill, power tool, bits, chucks)
- emery cloth
- copies of completed documentation from Task 1.

Materials:

- 6mm mild steel plate
- 6mm mild steel round bar
- 10mm mild steel flat bar
- mild steel chain (pre-fabricated)
- shackle (pre-fabricated)
- pin (pre-fabricated).

Task 3A – Quality review and testing

Candidates must:

a) prepare the work area to carry out non-destructive testing
b) perform quality assurance checks to the fabricated assembly
c) perform one non-destructive testing method to **three** different welds
d) record NDT test results in the quality check sheet.

Conditions of assessment:

- the time allocated for this task is **1 hour and 30 minutes**
- candidates must carry out the task on their own, under **controlled conditions** while being observed
- correct PPE must be worn at all times and as designated in their risk assessment (if unsafe working occurs the assessment must be stopped immediately).

Controlled conditions:

- candidates must only work on their 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
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- assessor observations must be carried out within the assessor to candidate ratio stipulated by City & Guilds
- where assessments need to be completed in a number of assessment sessions or over consecutive days all practical work areas and any evidence produced must be kept secure and must only be accessed by the assessor.

What must be produced for marking:

- completed quality check sheet with NDT results recorded.

Additional evidence for this task:

- assessor observation to include:
    - use of measuring equipment
    - application of non-destructive testing method
    - quality checks
    - review of work area (preparation, during and on completion of task).

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

Photographic evidence which shows:

- the quality review being undertaken, with consideration of
    - checking of tolerances and application and use of appropriate measuring equipment

    - how tolerances have been met for the measurement of components
    - how tolerances have been met for the fabrication of components
    - results of tool usage
- the non-destructive testing method used.

Resources:

- writing materials
- appropriate Personal Protective Equipment (PPE) (as per resources list)
- magnetic particle testing equipment
- welding brush
- welding magnifying glass
- cleaning products
- measuring equipment (with calibration certificate)
- quality check sheet from Task 1
- copies of completed documentation from Task 1
- completed assembly from Task 2.

Task 3B – Evaluation and recording

Candidates must**:**

a) produce an inspection report evaluating the production of the finished anchor. The report should typically be 800 words.
   This must include:
   - finished sizes of components and confirmation the fabricated anchor conforms to the dimensional requirements of the specification and meets industry standards
   - results from the non-destructive testing with reasonings and whether the welds meet industry standards
   - an explanation of the quality checks undertaken and the reasons for their use
   - an evaluation of the fitness for purpose of the finished assembly and method of production used with reasoning and justifications
   - a concessions list for every facet of the assembly that does not conform to the specification, reasons for occurrence and how to prevent reoccurrence
   - any amendments needed to their method statement with reasoning
   - any improvements or adaptions required to the anchor, including any reasoning and justifications if adaptions or improvements are not required.

Conditions of assessment:

- the time allocated for this task is **1 hours and 30 minutes**
- candidates must carry out the task on their own, under **controlled conditions** while being observed.

Controlled conditions:

- candidates must only work on their 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
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- assessor observations must be carried out within the assessor to candidate ratio stipulated by City & Guilds.

What must be produced for marking:

- quality inspection report.

Resources:

- writing materials or access to a computer to compose report
- copies of completed documentation from Task 1
- completed quality check sheet (from Task 3A)
- completed assembly for Task 2.

Task 3C – Handover

Candidates must:

a) hold a meeting with the supervisor to complete handover procedures, including:
    - confirmation of work completed
    - overview of finding in quality inspection report
    - suggested improvements to design or process
    - handover of finished anchor and quality inspection report.

Conditions of assessment:

- the time allocated for this task is **15 minutes**
- candidates must carry out the task on their own, under **controlled conditions** while being observed
- candidates must carry out the handover meeting, with the assessor (or another member of staff) taking the part of the supervisor
- there will be no interaction required or permitted as part of the handover.

Controlled conditions:

- candidates must only work on their 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
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- assessor observations must be carried out within the assessor to candidate ratio stipulated by City & Guilds.

What must be produced for marking:

- assessor observations:
    - handover meeting.

Additional evidence for this task:

- handover materials consisting of:
    - quality inspection report
    - completed anchor assembly.

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

Video evidence required:

- the handover meeting being undertaken.

Resources:

- quality inspection report
- completed anchor assembly from Task 2.

4. Centre guidance

Guidance provided in this document supports the administration of this project.

The following documents, available on the City & Guilds website, provide essential generic guidance for centres delivering Technical qualifications and **must** be referred to alongside this guidance:

- ***T level technical qualifications – marking***
- ***T level technical qualifications – moderation*** (updated annually)
- ***T level technical qualifications – teaching, learning and assessment***.

This assessment is designed to require the candidate to make use of their Core knowledge, understanding and the practical skills they have built up over the course of their learning to tackle tasks/problems/challenges.

This approach to assessment emphasises to candidates the importance and applicability of the full range of their learning to practice in their industry area and supports them in learning to take responsibility for transferring their knowledge, understanding and skills to the practical situation, fostering independence, autonomy and confidence.

Candidates are provided with an assignment brief. They then have to draw on their knowledge and skills and independently select the correct processes, tools, equipment, materials and approaches to take, to complete the brief.

During the learning programme, it is expected that tutors will have taken the opportunity to set shorter, formative tasks that allow candidates to be supported to independently use the learning they have so far covered, drawing this together in a similar way, so they are familiar with the format, conditions and expectations of the assessment.

Candidates should be made aware during learning what the assessment themes are and how they are implemented in marking the assignment, so they will understand the level of performance that will achieve them high marks.

Candidates should not be entered for the assessment until the end of the course of learning for the qualification, so they are in a position to complete the assignment successfully.

Health and safety

Candidates must not be entered for assessment without being clear of the importance of working safely and having attended sufficient practical training to be able to work safely. The assessor must immediately stop an assessment if a candidate works unsafely. At the discretion of the assessor, depending on the severity of the incident, the candidate may be given a warning. If they continue to work unsafely, risking the safety of themselves or others however, their assessment must be ended, and they must retake the assessment in a future series after significant further training has taken place. Any warnings issued to a candidate must be considered as part of the marking process and recorded on the candidate record form (CRF). Any actions that have led to that warning must be detailed on the CRF so they can be considered along with the other evidence when applying the descriptors in the mark scheme.

Compliance with timings

Due to the nature of this assessment, the maximum time allowances provided must be adhered to. They refer directly to assessment time, not any additional setting up times the centre needs to create an appropriate assessment environment.

It is the centre's responsibility to plan sufficient assessment sessions, under the appropriate conditions, within the assignment window, to allow candidates reasonable time to complete the assessment tasks.

Where candidates are required to plan their work, they should have their plans confirmed for appropriateness in relation to the time allocated for each task, to ensure their planning has not left them with too short a time to complete the tasks safely. Any planning that is not appropriate must be recorded on the Candidate Record Form (CRF) as part of the marking process.

Candidates should be allowed sufficient time to fully demonstrate the range of their skills, however this also needs to be reasonable and practicable. Candidates should be allowed to overrun their own planned timings in order for evidence of a range of their skills to be captured. If, however, the time required exceeds the maximum time allowance for the task, the centre must stop the assessment and base the marking on the evidence up to that point.

Any guidance or feedback relating to timings/planning should follow the guidance provided in section *Guidance and feedback* below.

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.

Assessor candidate ratios

The number of candidates an assessor will be able to observe at one time will vary depending on local conditions relating to:

- monitoring and maintaining safety during assessment
    - any specific hazards related to the task that pose a risk of harm in relation to the competence of the learners
    - availability of supervisory staff to support the assessor
- the practicalities of collecting evidence
    - the complexity of evidence collection for the task
    - whether there are any peak times where there is a lot of evidence to collect that will need additional support or any that are quieter which may be eased through staggered starts etc
    - local conditions e.g.
        - layout of the assessment environment and sufficient assessor line of sight to task activity throughout the assessment period
        - amount of additional support available (e.g. to capture image/video evidence)
        - availability of suitable workspaces/bays or of shared resources and equipment.

Centres are advised to trial the planned arrangements during formative assessment, reviewing the quality of evidence captured and manageability. It is expected that for straight forward observations, with favourable local conditions and support, (and unless otherwise specified) no more than six candidates will be observed by a single assessor at one time, and the number will usually be fewer than this maximum. The key factors to consider are the

logistics of collecting sufficient evidence and ability to remain working safely in the assessment environment. A timetable of assessments and layout of the workspaces, detailing:

- the students being assessed at each workstation,
- the assessor(s) and
- support staff present

must be available for the moderator on request.

Observation evidence

Observation notes form part of the candidate's evidence and must capture evidence of student performance during the practical tasks describing how well the activity has been carried out, rather than stating the steps / actions, the candidate has taken. The notes must be very descriptive and focus on the quality of the performance that are notable in relation to the quality indicators in the marking grid. They must provide sufficient, appropriate evidence that can be used by the assessor (and moderator) to mark the performance using the marking grid. These descriptions will be used, along with e.g. photographic and video evidence to choose the relevant marking band and mark within the band so that students can be reliably and validly differentiated based on their performance. Evidence captured in the observation form must give the necessary information to enable the final assessment of the task at a later date. This is to allow a holistic judgement to be carried out after all evidence for the task is available, at which point full consideration of how the student has applied both their skills and their knowledge during the practical can be given.

Identifying what it is about the performances that is different between candidates can clarify the qualities that are important to record. Each candidate is likely to carry out the same steps, so a checklist of this information would not help differentiate between them. However, qualitative comments on how well they do it, and quantitative records of accuracy and tolerances would.

The assessor should refer to the marking grid to ensure appropriate aspects of performance are recorded. These notes will be used for marking and moderation purposes and so **must** be detailed, accurate and differentiating.

Assessors should refer to the ***Technical qualifications guides on marking and moderation*** and The Guide Standard Exemplification Materials to support with the collection of evidence through observation.

Assessors should ensure that any required additional supporting evidence including e.g. photographs or video can be easily matched to the correct candidate, are clear, well-lit and showing the areas of particular interest in sufficient detail and clarity for assessment (i.e. taken at appropriate points in production, showing accuracy of measurements where appropriate).

Assessor marking and justification is completed on a separate form (CRF) to differentiate this evidence from the judgement, since in some cases the observation form will provide evidence relating to the judgement for more than one assessment theme.

As far as possible, candidates must not be distracted, or their performance affected by the process of observation and evidence collection.

The ***Technical qualifications guides on marking and moderation*** are essential guidance documents and are available on the City & Guilds website. These provide further information on preparing for assessment, evidence gathering, standardisation, marking and moderation, and must be referred to when planning and carrying out assessment.

Video and photograph evidence in T Level Technical qualifications

The assessment materials for each assignment identify the minimum candidate and assessor evidence requirements to support marking and moderation. Where ephemeral evidence (e.g. areas of candidate performance that may be hard to capture with photographs and assessor notes alone) plays a significant part of the practical assessment. If this is the case City & Guilds will prescribe the type/capture where the use of video is necessary for practical assessment components (e.g. specifying exactly which elements of the practical must be videoed, or photographed), and any technical specifications for these forms of evidence e.g. length of videos, maximum file sizes etc will also be supplied. Photographic and video evidence will be submitted along with the written candidate evidence and assessor evidence (PO forms) as described in the additional evidence section of the task.

If this is the case then the video evidence must meet these minimum requirements, in order to be considered by moderators:

- as per the guidance in section 2.3.2 of The *Marking and Moderation Guide for Centres*, assessors must ensure that this evidence can be easily matched to the correct candidate and task, is clearly shot, well-lit and shows the areas of particular interest in sufficient detail and clarity for assessment (i.e. filmed at appropriate points in production, showing accuracy of measurements where appropriate)

- the qualitative written evidence provided by assessors must
  - clearly identify the parts of the video that are being referred to, when used as supporting evidence. Using a timecode for this is recommended.
  - include their judgement on the performance being demonstrated

- Section 6.5 of the *Centre Manual* also contains general information about the requirements for video evidence submission.

Please note that centres must ensure that video evidence is clear and meets the minimum requirements. The ability of the moderators to take this evidence into account may be impaired and delay the moderation process if the requirements are not met.

Minimum evidence requirements for marking and moderation

The sections in the assignment:

- ***What must be produced for marking***, and
- ***Additional evidence for this task.***

These list the minimum requirements of evidence to be submitted for marking and the moderation sample.

Evidence produced during assessment above and beyond this may be submitted, as long as it provides useful information for marking and moderation and has been produced under appropriate conditions.

While technological methods which support the capturing or creating of evidence can be helpful, e.g. pin board style websites for creating mood boards, the final evidence **must** be converted to a suitable format for marking and moderation which cannot be lost/ deleted or amended after the end of the assessment period (e.g. screen prints, pdf files). Considerations around tracking authenticity and potential loss of material hosted on such platforms during assessment is the centre's responsibility.

Note: Combining candidates' individual pieces of evidence into single files or zip files may make evidence management during internal marking more efficient and will greatly simplify the uploading of the moderation sample.

Where the minimum requirements have not been submitted for the moderation sample by the final moderation deadline, or the quality of evidence is insufficient to make a judgement, the moderation, and therefore any subsequent adjustment, will be based on the evidence that *has* been submitted. **Where this is insufficient to provide a mark on moderation, a mark of zero must be given.**

Preparation of candidates

Candidates should be aware of which aspects of their performance will give them good marks in assessment. This is best carried out through routinely pointing out good or poor performance during the learning period, and through formative assessment. Although candidates will not have access to the marking grids during the assessment. Candidates should be made aware of what they need to do to achieve a pass or distinction by referring and formatively being assessed against grade descriptors as part of their formal learning programme.

During the learning programme, direct tutor instruction in how to approach tasks through modelling, support, guidance and feedback are critical. However, gradual removal of this support is necessary in preparation for summative assessment. This supported approach is not valid for summative assessment.

The purpose of summative assessment is to confirm the standard the candidate has reached as a result of participating in the learning process. Candidates should be encouraged to do the best they can and be made aware of the difference between these summative assessments and any formative assessments they have been subject to. Candidates will **not** have access to the marking grids. Refer to the ***T Level Technical qualifications – teaching, learning and assessment*** centre guidance document, available on the City & Guilds website for further information on preparing candidates for Technical qualification assessment.

Guidance on assessment conditions

The assessment conditions that are in place for this assignment are to:

- ensure the rigour of the assessment process
- provide fairness for candidates
- give confidence in the outcome.

They can be thought of as the rules that ensure that all candidates who take an assessment are being treated fairly, equally and in a manner that ensures their result reflects their true ability.

The conditions outlined below relate to this assignment. These do not affect any formative assessment work that takes place, although it is advised that candidates are prepared for the conditions they will need to work under during summative assessment.

The evidence for the tasks that make up this assignment must be completed under the specified conditions. This is to ensure authenticity and prevent malpractice as well as to assess and record candidate performance for assessment in the practical tasks. It is the centre's responsibility to ensure that local administration and oversight gives the assessor sufficient confidence to be able to confirm the authenticity of the candidate's work.

Security and authentication of candidate work

Candidate evidence must be kept secure to prevent unsupervised access by the candidate or others. Where evidence is produced over a number of sessions, the assessor must ensure candidates and others cannot access the evidence without supervision. This might include storing written work or artefacts in locked cupboards and collecting memory sticks of evidence produced electronically at the end of each session.

Candidates are required to sign declarations of authenticity, as is the assessor. The relevant form is included in this assignment pack and must be signed after the production of all evidence.

Where the candidate or assessor is unable to or does not confirm authenticity through signing the declaration form, the work will not be accepted at moderation and a mark of zero will be given. If any question of authenticity arises e.g. at moderation, the centre may be contacted for justification of authentication.

Accessibility and fairness

Where a candidate has special requirements, assessors should refer to the ***Access arrangements and reasonable adjustments*** section of the City & Guilds website.

Assessors can support access where necessary by providing clarification to any candidate on the requirements or timings of any aspect of this assignment. Assessors should not provide more guidance than the candidate needs as this may impact on the candidate's grade, see the guidance and feedback section below.

All candidates must be provided with an environment, time frame and resources that allows them reasonable access to the full range of marks available.

Guidance and feedback

To support centre file management, assessors may specify a suitable file format and referencing format for evidence (unless otherwise specified e.g. if file naming is an assessment point for the assignment). Guidance must only support access to the assignment brief and must not provide feedback for improvement. The level and frequency of clarification and guidance must be:

- recorded fully on the Candidate Record Form (CRF)
- taken into account along with the candidate's final evidence during marking
- made available for moderation.

Assessors must not provide feedback on the quality of the performance or how the quality of evidence can be improved. This would be classed as malpractice. However, this does not apply if the assessor asks questions as part of the assessment process. Such requirements will be specifically stated within task centre guidance.

Assessors should however provide general reminders to candidates throughout the assessment period to check their work thoroughly before submitting it, and to be sure that they are happy with their final evidence as it may not be worked on further after submission.

Candidates can rework any evidence that has been produced for each task during the time allowed.

Assessors should check and be aware of the candidates' plans and designs to ensure management of time and resources is appropriate, and so any allowed intervention can take place at an appropriate time.

The information on the guidance given and captured on the CRF is part of the evidence that must be taken into account along with the other evidence for the task when marking. It is up

to the assessor to decide if the guidance the candidate has required suggests they are lacking in any performance outcome and consider the severity of the issue when applying the marking criteria. The assessor must record where and how guidance has had an impact on the marks given, so this is available should queries arise at moderation or appeal.

What is, and is not, an appropriate level of guidance

- The assessor should intervene with caution if a candidate has taken a course of action that will result in them not being able to submit the full range of evidence for assessment. However, this should only take place once the assessor has prompted the candidate to check that they have covered all the requirements. Where the assessor has to be explicit as to what the issue is, this is likely to demonstrate a lack of understanding on the part of the candidate rather than a simple error, and full details should be recorded on the CRF.
- The assessor should not provide guidance if the candidate is thought to be able to correct the issue without it, and a prompt would suffice. In other words, only the minimum support the candidate actually needs should be given, since the more assessor guidance provided, the less of the candidate's own performance is being demonstrated and therefore the larger the impact on the marks awarded.
- The assessor must not provide guidance that the candidate's work is not at the required standard or how to improve their work. In this way, candidates are given the chance to identify and correct any errors on their own, providing valid evidence of knowledge and skills that will be credited during marking.
- The assessor must not produce any templates, pro-formas, work logs etc., unless instructed to in the assignment guidance. Where instructed to do so, these materials must be produced as specified and contain no additional guidance. If templates are provided as part of the assignment, these should not be adapted but can be provided to candidates either electronically or as paper based. Compliance of this requirement will be checked at moderation.

All specific prompts and details of the nature of any further guidance must be recorded on the relevant form and reviewed during marking and moderation.

5. Marking guidance

Guidance on marking

Please refer to the ***T Level Technical qualifications – marking*** *and* ***moderation*** centre guidance documents for further information on gathering evidence suitable for marking and moderation, and on using the marking grid and forms.

The Candidate Record Form (CRF) is used to record:

- details of any guidance or the level of prompting the candidate has received during the assessment period
- rough notes bringing together relevant evidence from across tasks during marking
- summary justifications when holistically coming to an overall judgement of the mark for each performance objective and overall
- if an assessment has to be stopped on the grounds of Health and Safety or if a candidate has been working in an unsafe manner.

The Practical Observation form (PO) is used to record:

- descriptive information and evidence of candidate performance during an observation.

Carrying out marking using assessment themes

The process of marking each assessment theme is iterative and should follow the process below which will become more spontaneous over time as the descriptors become familiar. It is recommended to refer back to these frequently however, so the standard does not unintentionally drift over the marking period.

The indicative content gives an indication of the expected content parameters the responses are likely to cover, and which aspects of the evidence are relevant. It is not exhaustive, and an acceptable answer may concentrate more on depth rather than fully cover the range indicated or deviate into relevant topics not listed.

The specific task evidence listed within the assessor guide and marking grid must be used to make a judgement on performance in relation the specific assessment theme.

The assessment tasks guide the production of valid evidence under appropriate conditions for assessment. Candidate evidence from a range of tasks may contribute to the marking of a single assessment theme, or from a single task to more than one assessment theme. In this case different aspects of the evidence are being considered for each theme and need to be judged against the marking descriptors specified in the assessment themes independently of each other.

In some cases, the quality indicators looked for in the judgement may naturally be more strongly evidenced in one piece of evidence than another. For instance, more formulaic/prescriptive forms of evidence may not be able to generate evidence of higher levels of performance, so this evidence would need to be looked for in the other forms of evidence. This means that where a range of evidence is to be assessed, it should be treated as a single package of evidence for the purposes of marking even if generated through different tasks.

Timing of marking

As some assessment themes require the triangulation of a number of pieces of evidence, marking cannot take place until after all of these are available. This does **not** however mean that all marking needs to take place after all candidates have completed the whole assessment.

Also, it is possible to begin recording the notes that will justify the marking for some assessment themes as evidence is produced, with the final mark only being decided once the complete array of evidence is available. This is particularly the case if later evidence is more confirmatory, and the earlier evidence is sufficiently informative for the qualities being assessed to make this a useful exercise.

Through planning, it should be possible to identify any evidence that can start being reviewed earlier, and the assessment themes which could be scheduled for earlier completion of marking e.g. while observation evidence is fresh in the mind should this be helpful. Care must of course be taken to ensure any evidence required by candidates to progress with another task are available for that task to take place. In addition, a sense check must take place across marking for each assessment theme, and across assessors, at the end to ensure marking has not drifted during the period. This may take the form of comparing candidate work to check that the ranking of quality of evidence matches the ranking of marks – where there are discrepancies marking should be checked for accuracy. These checks should be the responsibility of the Internal Quality Assurer and undertaken as part of the centre's Internal Quality Assurance strategy.

Process for each assessment theme:

- Select the range of evidence relevant for making the judgement – this is indicated in the mark scheme for each assessment theme. However, should relevant evidence for any candidate be found elsewhere amongst the rest of their evidence, this may also be taken into consideration when making the marking judgement as long as it is:
    - valid in relation to the assessment theme
    - is produced under appropriate conditions
    - and the marker is confident that it is authentic.
- Scan/read the candidate evidence, any notes on the CRF e.g. regarding level of support/guidance recorded, evidence captured by the assessor and the indicative content and band descriptors in the mark scheme.
- Note: for any warnings given during the assessment the actions that have led to that warning must be detailed on the CRF so they can be considered along with the other evidence when applying the descriptors in the mark scheme.
- Note: the evidence contained on the CRF must be considered and a judgement made on the level of performance the candidate has independently demonstrated – this will vary depending on the level of support detailed on the CRF – i.e. consider all relevant evidence and then judge the appropriate mark following the process below.
- Make an initial assessment of the required evidence as a whole, considering each band in turn and considering the level of performance described in the context of the knowledge and skills in the indicative content to make a balanced judgement of the best band to use as a starting point.
- Read the evidence and review it against the band descriptor in more detail, deciding if the response is securely sitting within the band; i.e. all quality characteristics described by the band descriptor are seen, and strongly meets the level of performance described by the descriptor holistically (i.e. across the range of relevant evidence):

- check the descriptor for the level above
- if the evidence clearly shows some of the characteristics of the higher band, select a suitable mark at the bottom of that band
- if *not* showing characteristics of the higher band revert to the original band, select a mark at the higher end of that mark range.

If the response is not securely in the band, but *is partially* showing the characteristics of the band,

- check the descriptor of the level below
- decide on a suitable mark either at the bottom of the original band as some characteristics shown, or top of the lower band if it better describes the quality of the characteristics being shown.

If the response is largely meeting the band, with only a few concerns, and is not showing characteristics aligning with the higher or lower bands, the appropriate mark is likely to be in the middle range.

If there is no alignment with the descriptor, reassess the starting band, and begin again.

- Based on the level of alignment with the descriptor, confirm the final mark within the band, bearing in mind that the available marks form an *evenly distributed scale*:
  - if the quality of response *fully* aligns with the performance described by the descriptor – assign a high mark within the band
    If the quality of the response *partially* aligns with the performance described by the descriptor – assign a low to medium mark within the band
  - consider the quality compared to a range of similar responses (e.g. relevant annotated training material exemplars, responses reviewed during standardisation, and through experience) choose a mark on the point on the scale that would give an appropriate ranking for the assessed piece of evidence in relation to this information and in comparison, with that of the rest of the cohort for that assessment theme.

Marking grids

There is a marking grid for each assessment theme that must be assessed as part of this occupational specialism assessment. The individual statements within the band descriptors should be treated together to make one whole descriptor and not separately.

Assessment theme – Health and safety

Guidance for assessors

Evidence from Tasks 1,2, 3a and 3c should be used to assess performance against this assessment theme.

Task 1

- resources list with measuring equipment calibration check recorded
- risk assessment
- method statement with justifications.
- hot works permit (countersigned by assessor).

Task 2

- assessor observation:
    - the work area, prior to, during and on completion of fabrication activities
    - preparation of tools and equipment
    - welding and tool skills
    - use of cutting list (noting any changes made)
    - production stages of anchor (marking out, cutting, welding preparation, welding, finishing and final assembly)
    - the application and use of tools and equipment
        - the use of two different welding processes
        - the use of two different welding techniques.

- photographic evidence:
    - the work area, prior to, during and on completion of fabrication activities
    - cutting and preparation of cut components

- application of welding techniques, showing two different welding processes and two different welding positions.

Task 3a

- assessor observations:
  - application of non-destructive testing method
  - quality checks
  - review of work area (preparation, during and on completion of task).
- photographic evidence:
  - the quality review being undertaken, with consideration of
    - checking of tolerances and application and use of appropriate measuring equipment
    - how tolerances have been met for the measurement of components
    - how tolerances have been met for the fabrication of components
    - results of tool usage
  - the non-destructive testing method used.

Task 3c

- assessor observations:
  - handover meeting.

Note: where there is insufficient evidence to award a mark, a zero mark may be given	**Band 1 descriptor**	**Band 2 descriptor**	**Band 3 descriptor**	**Total marks per sub assessment theme**	**Total marks for assessment theme**
	Indicative content: Completion of a comprehensive assessment of risk and risk management including risks associated with tools and welding equipment, work area and the safety of others. Risk assessment to include all fabrication and welding processes: • identification of low, medium and high risks that may include: ○ high risk: fumes and gas inhalation, physical (burns, cuts, crushed toes/fingers, eye damage), non-ionising radiation, electricity (shock, electrocution), fire and explosions				

	○ medium risk: noise, trailing cables/pipes ○ low risk: slip, trip and falls, disposal of waste, handling materials and equipment (manual handling, minor physical injuries, handling and storing gas cylinders/bottles), work environment • analysis of the risk occurring, including who could be affected and the likelihood of them being affected • identification of control measures using hierarchy of control, including PPE (auto-darkening welding helmet, air-fed welding helmet, welding jacket or apron, welding shoes/boots, gloves, safety glasses, ear plugs or ear defenders, mask or respirator, managing long hair/loose clothing), isolation, ventilation, fire prevention. Completion of a hot works permit and permission to start work obtained (checked and countersigned by the assessor). Production and testing of the anchor: • correct checks and preparation of resources including tools and welding equipment (MMA, MIG, TIG, Oxy-acetylene), PPE (auto-darkening welding helmet, air-fed welding helmet, welding jacket or apron, welding shoes/boots, gloves, safety glasses, ear plugs or ear defenders, mask or respirator) • safe isolation procedures for tool/machinery maintenance, replacement or adjustment, completed accurately and safely. (Failure to complete safe isolation as specified and leading to an unsafe situation, will require the assessment to be stopped immediately) • work environment must be prepared for welding and fabrication (well ventilated, have first aid and eye wash station, fire extinguishers, fire blankets, segregated disposal of waste) • work area to be kept tidy throughout the tasks and reinstated after completion of practical activities • wearing the correct PPE (auto-darkening welding helmet, air-fed welding helmet, welding jacket or apron, welding shoes/boots, gloves, safety glasses, ear plugs or ear defenders, mask or respirator, managing long hair/loose clothing) at all times, as identified in their risk assessment and/or materials list • following safe systems of work throughout all practical activities, when working and handling materials • all tools and welding equipment checked prior returning to storage. Completion of an evaluation and implementation report including: • health and safety regulations (HASAWA, COSHH, PUWER, Manual Handling, Waste) • workplace procedures relating to safe use of tools and equipment, materials, consumables, maintenance and disposal of waste • checking and complying with manufacturer's manuals and safety information • measures required for ventilation and fume management • measures required for dealing with emergencies

	• implications of incorrect set-up and maintenance of welding equipment (injury, fire, explosion, damage to equipment, damage to work, physical harm) • implications of incorrect construction, assembly and overall performance of the anchor.				
Marks per band	**1 - 4**	**5 - 8**	**9 - 12**	**n/a**	**12**
	Risk assessment is mostly complete and covers some of the major risk factors. Risk mitigation methods are limited. Likelihood, severity or probability has been taken into account but not for all risks and hazards. Basic visual safety checks of welding equipment carried out whilst following appropriate isolation procedure. Health and safety is followed during preparation and throughout tasks so that work is completed safely	Risk assessment is complete and covers all of the major risk factors and a good range of other associated risks. Risk mitigation methods have been identified for some of the potential risks, but not all. Likelihood, severity or probability has been taken into account but for most risks and hazards. A good range of safety checks of welding equipment carried out, including some safety checks on other associated equipment, whilst following appropriate isolation procedure. Health and safety is followed during preparation and throughout tasks so that work completed safely.	Risk assessment identifies all of the major risk factors and all other associated risk factors. Risk mitigation methods are detailed and have been clearly identified for all potential risks. Potential for harm and probability factors have been identified throughout. Thorough safety checks to all welding equipment carried out, including an inspection of the condition of all cables, electrical and gas connections, and any ancillary equipment used whilst following appropriate isolation procedure. Health and safety is followed during preparation and throughout tasks, all work completed safely. All risks		

	but on occasions when working, some potential hazards were missed. Work area left in safe condition, some tools and equipment not returned to correct storage facilities, disposal of waste was carried out but with limited reference to disposal requirements and waste regulations.	Most risks and hazards that occur during the tasks are correctly mitigated against as they arise. Work area left safe, clean and tidy, with most tools and equipment returned to correct storage facilities, disposal of waste was carried out but with some reference to disposal requirements and waste regulations.	and hazards that occur during the tasks are correctly mitigated against as they are arise. Work area returned to original condition with all tools and equipment returned to correct storage facilities, disposal of waste was carried out taking into account all of the disposal requirements and waste regulations.		

Assessment theme – Planning and preparation

Guidance for assessors

Evidence from Tasks 1, 2 and 3a should be used to assess performance against this assessment theme.

Task 1

- resources list with measuring equipment calibration check recorded
- method statement with justifications
- cutting list
- quality check sheet.

Task 2

- assessor observation:
    - preparation of work area
    - preparation of tools and equipment
    - use of cutting list (noting any changes made)
    - production stages of anchor (marking out, cutting, welding preparation, welding, finishing and final assembly).

Task 3a

- assessor observation:
    - quality checks
    - review of work area (preparation, during and on completion of task).

Note: where there is insufficient evidence to award a mark, a zero mark must be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks per assessment theme
	Indicative content: Planning: • analysis and interpretation of technical documentation including the assignment brief, diagrams/drawings, specification, and requirements, using information gathered in the brief provided to plan all activities • an understanding of correctly interpreting safety/data COSHH sheets, manufacturer's manuals and information in relation to welding equipment (TIG, MIG, MAG, MMA), cutting equipment (flame, plasma, laser, power nibblers, hand tools) materials (steel bar, steel plate, pre-fabricated components (pin, shackle, chain) and consumables used throughout the tasks • completion of a method statement of how the tasks will be carried out in a safe and logical manner with reasoning to support methods given, identifying a sequence of activities and using correct technical terminology • work planning to include resources list, cutting list, fabrication layout and sequence of fabrication • list of appropriate requirements and resources needed to carry out the tasks, with justifications for selection of components and tools, materials and equipment for different aspects of the assignment, wastage and disposal requirements • type, size and quantities needed of resources to complete the tasks in a timely manner • checking of documentation for discrepancies or issues • using quality checks to confirm the effectiveness of the quality check sheet produced. Preparation: • implementation of plans (standard operating procedures, safe systems of work, sequence of activities) • to ensure efficiency of completing the tasks, preparation of: o materials (steel bar, steel plate, pre-fabricated components (pin, shackle, chain)) o tools and equipment: welding equipment (TIG, MIG, MAG, MMA), cutting equipment (flame, plasma, laser, power nibblers, hand tools), abrasive equipment (files, angle grinder, grinding discs), forging equipment (hammers, furnace or equivalent, tongs, clamping vice), NDT equipment (magnetic particle testing (electromagnets, magnetic dry powder, powder bulb and blower, aerosol solvent cleaner, wire brush, welding magnifying glass)			

	○ work area (well ventilated, have first aid and eye wash station, fire extinguishers, segregated disposal of waste).				
Marks per band	**1 - 2**	**3 - 4**	**5 - 6**	**6**	**12**
Planning	Limited resources and requirements listed, including relevant technical documentation, with limited justifications. Basic method statement contains limited information of the scope, processes, tools and equipment. Limited use of relevant technical terminology and some reference to industry standards. Planning does not fully take into account implications of potential issues with the fabrication and welding processes resulting in potential non-conformity with the specification.	Most resources and requirements listed, including technical documentation, with some justifications for most, or full justifications for some. Logical method statement contains some detailed information of the scope, processes, tools and equipment. Some use of relevant and industry standard technical terminology and good reference to industry standards. Planning takes into account most implications of potential issues with the fabrication and welding processes resulting in reduced potential of non-conformity with the specification.	Comprehensive list of all resources and requirements, including technical documentation, with full justifications for all. Well-structured method statement contains fully detailed information of the scope, processes, tools and equipment. Relevant and industry standard technical terminology consistently used throughout, very good referencing of industry standards. All possible implication issues with the fabrication and welding processes are taken into account, resulting in limited potential of non-conformity with the specification.		

Marks per band	1 - 2	3 - 4	5 - 6	6	
Preparation	A limited range of materials, components and resources selected with limited evaluation of preparatory checks taking into account working condition, serviceability or feasibility for the task. Limited range of relevant technical documentation has been prepared but may not have included the quality, accuracy or completeness. Work area prepared safely, sometimes referencing the prepared method statement and workflow. Limited tool calibration checks undertaken.	A good range of materials, components and resources selected with good evaluation of preparatory checks taking into account working condition, serviceability and feasibility for the task. A good range of relevant technical documentation has been prepared for some tasks, with quality, accuracy and completeness taken into account. Work area prepared safely with clear referencing of the prepared method statement and workflow, with safe isolation and calibration checks on most listed tools and equipment.	A comprehensive range of materials, components and resources selected with detailed evaluation of preparatory checks for working condition, serviceability and feasibility. A comprehensive range of technical relevant documentation has been prepared for all tasks, quality, accuracy and completeness are fully taken into account. Work area prepared safely with comprehensive referencing of the prepared method statement and workflow, with safe isolation and calibration checks on all listed tools and equipment.		

Assessment theme – Production and assembly

Guidance for assessors

Evidence from Tasks 1 and 2 should be used to assess performance against this assessment theme.

Task 1

- method statement with justifications
- cutting list.

Task 2

- fully fabricated and welded anchor consisting of:
    - stock
    - crown
    - shank
    - flukes and support
    - pre-fabricated shackle with chain attached
- assessor observations:
    - preparation of work area
    - preparation of tools and equipment
    - welding and tool skills
    - use of cutting list (noting any changes made)
    - production stages of anchor (marking out, cutting, welding preparation, welding, finishing and final assembly)
    - the application and use of tools and equipment:
        - the use of two different welding processes
        - the use of two different welding techniques
- photographic evidence:
    - the work area, prior to, during and on completion of fabrication activities
    - marking out and use of measuring equipment
    - cutting and preparation of cut components
    - application of welding techniques, showing two different welding processes and two different welding positions
    - completed anchor (with the pre-fabricated shackle and chain attached).

Note: where there is insufficient evidence to award a mark, a zero mark may be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks for assessment theme
	Indicative content: Measuring and marking out: • application and use of relevant technical information to accurately complete fabrication to client requirements • correct marking techniques adopted to mark out of each component within given tolerance and taking measures to avoid excess material waste • use of correct units of measurement • identification and explanation of any discrepancies in measurements against known standards. Cutting components: • correct cutting techniques (manual, machine) used for cutting out each component • correct techniques used for preparing cut pieces by abrasion to required standard for fabrication • in-production measurement checks undertaken to confirm correct size. Techniques and methods: • technical knowledge and understanding of: ○ materials and consumables (steel bar, steel plate, pre-fabricated components (pin, shackle, chain), and electrodes, wire or electrode feed) ○ welding systems and processes (TIG, MIG, MAG, MMA) ○ welding positions (flat (PA), horizontal (PC), vertical Up (PF), and overhead butt (PE)) • fabricated in the correct order as stated on the engineering drawing and their own method statement • correct application of tack welds to the correct size prior to full welding taking place • fabrication fully stiffened and square prior to welding • produced good quality welds as per industry standard (BS EN ISO 5817). Tools and equipment: • application of all tools and equipment including:				

	○ measuring and marking out equipment (tapes, calipers, rulers, T-squares, marking tool, gauges) ○ cutting equipment (flame, plasma, laser, power nibblers, hand tools, workshop saws) ○ abrasive equipment (files, angle grinder, grinding discs, wire brush) ○ welding equipment (TIG, MIG, MAG, MMA, clamps, welding table, welding magnets, electrodes, wire or electrode feed) ○ forging equipment (hammers, furnace or equivalent, tongs, clamping vice) ○ non-destructive testing equipment: magnetic particle testing equipment (electromagnetic yoke, magnetic dry powder, powder bulb and blower, aerosol solvent cleaner, wire brush, welding magnifying glass) • correct setting up of welding machine/equipment parameters, identification of operating modes of equipment and implications of incorrect settings • two different welding processes used during the fabrication and welding of the anchor • fabricated the anchor using two different welding positions • monitoring performance of equipment during welding activities • application of tool skills (marking out, cutting, abrading, welding, NDT testing), techniques to avoid causing damage and defects to materials or equipment • cleaning, maintaining and storing tools and equipment on completion of activities • all scrap metal is correctly disposed of, and work area is left clean.				
Marks per band	**1 – 2**	**3 – 4**	**5 – 6**	**6**	**42**
Measuring and marking out	Marking out has been completed, methods used lacks efficiency resulting in some inaccuracies and some excessive waste materials created. Basic understanding of measurement terminology and the application of correct unit	Marking out is mostly accurate and method used is correct, resulting in only minor inaccuracies and minor waste materials created. Good understanding and application of measurement terminology and the application of	Marking out is accurate and uses correct method which meets the design specification. No additional waste created. Comprehensive understanding and application of measurement terminology		

	of measurement is sometimes accurate.	correct unit of measurement is accurate most of the time.	and the application of correct unit of measurement is accurate all of the time.		
Marks per band	**1 – 4**	**5 – 8**	**9 – 12**	**12**	
Cutting components	Cutting skills are basic resulting in significant re-work required to prepare the cut pieces for fabrication. Some size discrepancies of cut pieces from the marked out plan. In-production checks are carried out with some tolerances are met.	Cutting skills are good resulting in minimal re-work required to prepare the cut pieces for fabrication. Minor size discrepancy of cut pieces from the marked out plan. In-production checks are carried out with most tolerances are met.	Cutting skills are very good resulting in no additional work required to prepare the cut pieces for fabrication. No size discrepancy of cut pieces from the marked out plan. In-production checks are carried out, all tolerances are met.		
Marks per band	**1 – 4**	**5 – 8**	**9 – 12**	**12**	
Assembly techniques and methods	Fabrication process follows logical sequencing in line with the method statement some of the time. Basic understanding of welding processes and techniques and positioning to achieve a quality weld.	Fabrication process follows logical sequencing in line with the method statement most of the time. Good understanding of welding processes and techniques and positioning to achieve a quality weld.	Fabrication process follows logical sequencing in line with the method statement all of the time. Comprehensive understanding of welding processes and techniques and positioning to achieve a quality weld.		

	Welding techniques and methods used results in a fabrication with areas of excessive welding.	Welding techniques and methods used results in a fabrication with some areas of excessive welding.	Welding techniques and methods used results in a fabrication with no areas of excessive welding.		
Marks per band	**1 – 4**	**5 – 8**	**9 – 12**	**12**	
Tools and equipment	Use of measurement tools is basic, and requires more than one attempt, resulting in some incorrect component sizes. Use of cutting tools is basic and requires more than one attempt to produce some components. **Two** welding processes and **two** welding positions are used effectively to form the welds some of the time. Overall application of tool skills resulting in an acceptable quality finish but with some noticeable surface defects which detract from the appearance of the finished fabrication.	Use of measurement tools is good and completed on the first attempt most of the time. Use of cutting tools is good and most components are completed on the first attempt. **Two** welding processes and **two** welding positions are used effectively to form the welds most of the time. Overall application of tool skills resulting in a good quality finish but with some minor surface defects but does not attract from the appearance of the finished look of the fabrication.	Use of measurement tools is very good and completed on first attempt. Use of cutting tools is very good and all components are completed on first attempt all of the time. **Two** welding processes and **two** welding positions are used effectively to form the welds all of the time. Overall application of tool skills resulting in a high quality finish with no areas of surface defects and meets the specification of the finished fabrication.		

Assessment theme – Quality testing, review and evaluation

Guidance for assessors

Evidence from Tasks 1, 3a, 3b and 3c should be used to assess performance against this assessment theme.

Task 1

- method statement with justifications
- quality check sheet.

Task 3a

- completed quality check sheet with NDT results recorded.
- assessor observation:
    - the application of non-destructive testing method
    - quality checks.
- photographic evidence:
    - the quality review being undertaken, with consideration of
        - checking of tolerances and application and use of appropriate measuring equipment
        - how tolerances have been met for the measurement of components
        - how tolerances have been met for the fabrication of components
        - results of tool usage
    - the non-destructive testing method used.

Task 3b

- quality inspection report.

Task 3c

- assessor observation:
    - the handover meeting
- video evidence:
    - the handover meeting being undertaken.

Note: where there is insufficient evidence to award a mark, a zero mark may be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks for assessment theme
	Indicative content: **Quality testing:** • quality testing method (magnetic particle testing) correctly applied • results of testing of 3 selected welds, accurately recorded on quality check sheet • welding defects identified with cause and rectification process. **Quality review:** • quality monitoring of processes made at each stage of the process • checking the final product conforms to brief, specification, dimensions and design. **Reporting, recording and handover:** Completion of a quality inspection report to include: • finished sizes of components and confirmation the assembly conforms to the dimensional requirements of the specification and meets industry standards • results from the non-destructive testing with reasonings and whether the welds meet industry standards • an explanation of the quality checks undertaken and the reasons for their use • an evaluation of the fitness for purpose of the finished assembly and method of production used with reasoning and justifications • problems encountered during the production and assembly, including reasoning and solutions. • a concessions list for every facet of the assembly that does not conform to the specification, reasons for occurrence and how to prevent reoccurrence • any amendments needed to their method statement with reasoning • any improvements or adaptions required to the anchor, including any reasoning and justifications if adaptions or improvements are not required • recording documentation captures key data and conforms the level of quality achieved • documents are collated from all process stages				

	• information and terminology accurate throughout and presented clearly • records of waste disposal and recycling of waste. Handover to include: • use of technical communication and vocabulary during meeting • summary of findings and outcome of activities, problems incurred/resolved • summary of potential improvements to assembly or process for future production • handover procedures and requirements, presenting finished report and completed assembly.				
Marks per band	**1 – 3**	**4 – 6**	**7 – 9**	**9**	**24**
Quality testing	Basic understanding of the testing process. Some equipment inaccuracies whilst carrying out the test, resulting in re-testing being required more than once. Testing and inspection processes are basic, some inaccuracies, carried out in order to check the product meets the design criteria. Basic interpretation and application of some parameters or tolerances.	Good understanding of the testing process. Good use of testing equipment with some minor inaccuracies with no re-testing required. Testing and inspection processes are good, some minor inaccuracies, carried out in order to check the product meets the design criteria. Clear interpretation and application of some parameters or tolerances.	Comprehensive understanding shown of testing process. Very good use of testing equipment, no inaccuracies encountered or re-testing required. All testing and inspection processes carried out in order to check the product meets the design criteria, with no inaccuracies. Comprehensive interpretation and application of some parameters or tolerances.		
Marks per band	**1 – 3**	**4 – 6**	**7 – 9**	**9**	
Quality review	A brief description of the processes and techniques undertaken to produce the fabrication, some but not	A good description of the processes and techniques undertaken to produce the fabrication, with most	A comprehensive description of the processes and techniques undertaken to produce the		

	all inconsistencies listed and reasoned but no future prevention methods suggested. A limited range of additional factors that may affect the implementation of the design are described. Evaluation is basic and identifies a list of improvements with brief justification. Where no improvements/adaptions are needed, this is supported with brief reasoning and justifications to why.	inconsistencies listed and reasoned and some future prevention methods suggested. A good range of additional factors that may affect the implementation of the design are described. Evaluation is good and identifies a range of improvements with good justification. Where no improvements/adaptions are needed, this is supported with good reasoning and justifications to why.	fabrication, with any inconsistencies listed, well-reasoned and future prevention suggested. A comprehensive range of additional factors that may affect the implementation of the design are explained in detail. Evaluation is thorough and identifies a comprehensive range of improvements with clear and detailed justification. Where no improvements/adaptions are needed, this is supported with detailed and thorough reasoning and justifications to why.		
Marks per band	**1 – 2**	**3 – 4**	**5 – 6**	**6**	
Reporting, recording and handover	Reporting contains the appropriate information and uses correct technical terminology some of the time. Test records are recorded with detectable faults/defects identified some of the time. Some inaccuracies in recording of test results and final measurements.	Reporting contains the appropriate information and uses correct technical terminology most of the time. Test records are recorded with detectable faults/defects identified most of the time. Some minor inaccuracies in recording of test results and final measurements.	Reporting contains the appropriate information and uses correct technical terminology all of the time. Test records are recorded with detectable faults/defects identified all of the time. Recording of test results and final measurements are accurate.		

	Handover meeting is brief, some explanation given to the findings of the report. Basic level of terminology used throughout. Terminology used may have inaccuracies may include inconsistencies and not clear to the targeted audience.	Handover meeting is good, clear explanation given to the findings of the report. Correct industry terminology mostly used throughout. Terminology used is mostly accurate with minor errors but does not always take into account the target audience.	Handover meeting is comprehensive, detailed explanation given to the findings. Correct industry terminology used freely and confidently throughout to the targeted audience.		

6. Links to Maths, English and Digital Skills

The table below indicates where each of the General Maths, English and Digital Competencies have been integrated into the assignment tasks.

Task	Skills
1	MC1, MC2, MC4, MC8, EC2, EC3, EC4, DC1
2	MC1, MC2, MC3, MC4, MC5, MC6, MC7, EC2, EC3, EC4
3	MC8, EC1, EC2, EC6, DC4, DC3

7. Declaration of authenticity

Assessment ID	Qualification number
Candidate name	**Candidate number**
Centre name	**Centre number**

Additional Support

Has the candidate received any additional support in the production of this work?

No □ **Yes** □ (Please tick appropriate)

If yes, give details below (and on a separate sheet if necessary).

Candidate:

I confirm that all work submitted is my own, and that I have acknowledged all sources I have used.

Candidate signature	Date

Assessor:

I confirm that all work was conducted under conditions designed to assure the authenticity of the candidate's work, and am satisfied that, to the best of my knowledge, the work produced is solely that of the candidate.

Assessor signature	Date

Note: Where the candidate and/or assessor is unable to or does **not** confirm authenticity through signing this declaration form, the work will be returned to the centre, and this will delay the moderation process. If any question of authenticity arises, the assessor may be contacted for justification of authentication.

8. Candidate Record Form (CRF) - Exemplar

T level technical qualifications

(T level technical qualification – Fabrication and welding occupational specialism)

Candidate name	Candidate number
Centre name	**Centre number**

Marker Notes *– Please always refer to the relevant marking grid for guidance on allocating marks and make notes which describe the quality of the evidence and justification of marks.*

Please record any guidance, intervention (including Health and Safety) or feedback that is given to a candidate.

Expand boxes as required.

Health and safety												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mark	Notes and justification											

Planning and preparation						
Planning						
	1	**2**	**3**	**4**	**5**	**6**
Mark	Notes and justification					
Preparation						
	1	**2**	**3**	**4**	**5**	**6**
Mark	Notes and justification					

Production												
Measuring and marking out												
	1	**2**		**3**		**4**		**5**		**6**		
Mark	Notes and justification											
Cutting components												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mark	Notes and justification											
Assembly techniques and methods												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mark	Notes and justification											
Tools and equipment												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mark	Notes & justification											

Quality testing, review and evaluation									
Quality testing									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Mark	Notes and justification								
Quality review									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Mark	Notes and justification								
Reporting, recording and handover									
	1		**2**	**3**	**4**		**5**		**6**
Mark	Notes and justification								

Internal assessor signature	Date	Total

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