

## Marine Engineer - Level 3. End-point Assessment Plan

End-point assessment summary:

This document sets out the requirements for the independent end-point assessment for the Marine Engineer Level 3 apprenticeship standard, which determines whether an apprentice has developed the knowledge, understanding, skills and behaviours required of a competent marine engineer.

The detail in this plan has relevance to a wide range of people including marine engineer apprentices, employers, training providers and end-point assessment organisations, as it provides information about the assessment requirements and the respective roles and responsibilities of those involved in the end point assessment process.

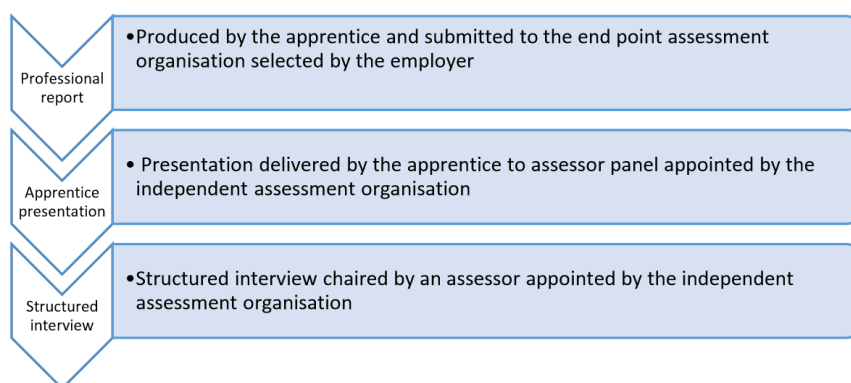
The apprenticeship comprises two stages:

- on programme stage (foundation phase and development phase) that develops the underpinning knowledge, understanding, skills and behaviours of an apprentice and prepares an apprentice for the
- end-point assessment stage.

The marine engineer apprenticeship typically takes 42 months to complete, with the end-point assessment being typically taking 6 months to complete.

### End point assessment methods

The end-point assessment (EPA) comprises the following assessment methods, which are undertaken in the order shown:



Apprentices must pass each of the above end-point assessment methods to successfully complete their apprenticeship.

The requirements for the professional report, presentation and structured interview, as outlined in this plan, will be delivered by an end-point assessment organisation, selected by employers from those end-point assessment organisations registered and detailed on the Register of End-Point Assessment Organisations (RoEPAO).

The end-point assessment organisation will have had no involvement in the on-programme development (on-programme training or on-programme assessment) of the apprentice undertaking the end point assessment.

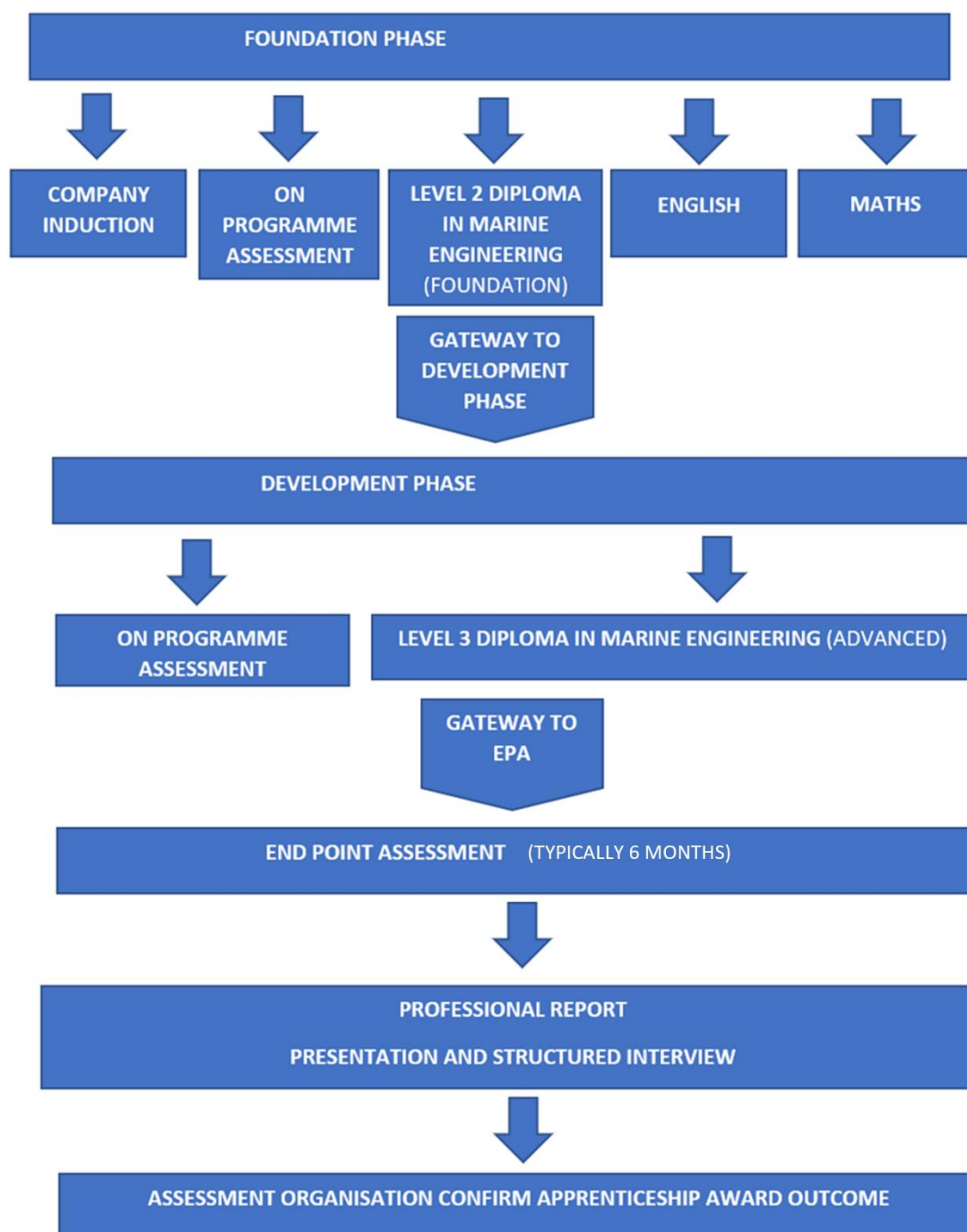
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Apprentices who successfully complete and pass all three of the end point assessment methods can go on and apply for registration of EngTech with the relevant professional institution, should they wish.

### Progression to end point assessment

Developing the competence of a marine engineer apprentice is undertaken throughout the apprenticeship and culminates at end-point assessment. The following diagram illustrates the typical journey of a marine engineer apprentice and the requirements and gateways that lead to end point assessment.

**Diagram 1: Typical journey of a marine engineer apprentice**



## End-point assessment (typically 6 months) - the detail

End-point assessment gateway:

An apprentice's progression to end-point assessment is made when the employer confirms that an apprentice has successfully completed and passed the mandated on programme qualifications – Level 2 Diploma in Marine Engineering Foundation and Level 3 Diploma in Marine Engineering Advanced, has acquired and demonstrated the required competence (knowledge, skills and behaviours), and is deemed ready and able to complete the end point assessment.

Employers have overall responsibility for undertaking a review to assess an apprentice's progression, capability and readiness to undertake end-point assessment. Employers may want to seek feedback from an apprentice's supervisor/mentor, training provider etc.

The apprentice must have achieved English and maths qualifications in line with the apprenticeship funding rules.

### What is being assessed at end point assessment?

The end-point assessment is a synoptic assessment combining different elements of the apprenticeship standard to demonstrate the breadth and depth of the knowledge, understanding, skills and behaviours detailed in the marine engineer apprenticeship standard.

The focus of the end-point assessment is on an apprentice being able to demonstrate competence in their occupational role and meet the criteria of the standard, illustrating this across the three mandatory assessment methods undertaken by the apprentice during the EPA period.

See Appendix A for details of which knowledge, understanding, skills and behaviours will be assessed by each assessment method. Appendix C maps the requirements of the Marine Engineer Standard to the assessment methods matrix.

### End-point assessment methods

The end-point assessment comprises the following assessment methods that need to be undertaken and completed in the order detailed below:

Professional report – The professional report forms the first element of the end-point assessment. Apprentices will have 8 weeks to complete the report, collate appropriate supportive evidence and submit following approval of the report title and focus by their end-point assessment organisation.

The professional report must evidence work carried out by the apprentice and provide evidence of an apprentice's professional competence, responsibilities and experience and how these meet the competencies across the breadth and depth of the standard. The report title and focus is discussed in more detail on the next page.

The report should enable apprentices to assimilate and describe work undertaken against the areas detailed in the standard, how it was done, best practice followed, problems and challenges encountered, and how these were overcome and how these contributed to any new knowledge, understanding, skills and behaviours being developed.

The report title and focus should allow the apprentice to demonstrate the application and competence of the higher order knowledge, understanding, skills and behaviours detailed in the standard and against the requirements of EngTech as a minimum.

The report title and focus will need to be approved by the end-point assessment organisation and should take account of the apprentice's employer's work focus and environment.

An example of what a report's focus may comprise is provided below and will depend on the type of boat and whether it is a new build and installation or a refit and repair, and evidence submitted must fulfil the criteria in Appendix A:

- 3 examples of different tasks/projects undertaken where the apprentice solved technical marine engineering problems, explaining their role and how they selected and used appropriate marine engineering principles, processes, flows and methods following safe systems of work.
- 3 detailed descriptions of how the apprentice has identified, planned and organized resources to undertake marine engineering tasks in a safe manner.
- Explanations of how the apprentice has responded appropriately to customer needs (internal and external).
- 3 explanations of how the apprentice has supported commission, test and sea trials.
- An example of how the apprentice has applied business improvement techniques and contributed to improvements in working practices.

End-point assessment organisations will provide a suggested report template along with guidance notes directing an apprentice as to:

- The title of the report.
- Directions on relevant content and structure.
- The level of content expected.
- What constitutes best practice in producing the report.
- The requirements in relating contents to areas within the standard and where necessary professional registration requirements.

The report must have a word count of 4000 words +/- 10%, excluding supporting information that may be included as appendices. The supporting information may include:

- Minutes of meetings, action plans, etc
- Digital images and recordings
- Internal and external correspondence
- Reference to work products, if necessary
- Achievement and evidence on performance related processes and appraisals
- Witness testimonies
- Other documentation as appropriate that helps support an apprentice's explanation and review, as required by the report's focus

Any supporting information provided must have direct relevance to the focus of the report and any data protection or confidentiality policies and regulations must be adhered to.

The report should be submitted electronically.

The report will be graded pass/fail.

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Where the submitted report is not to the required level, the end-point assessment organisation must provide feedback to the apprentice and their employer and agree timescales for re-work and re-submission.

The apprentice must have attained a pass mark for the professional report before undertaking the presentation and structured interview. The end-point assessment organisation must schedule the presentation and structured interview to allow for the report to be provisionally marked, feedback given, and any re-work or re-submission to be undertaken.

The presentation and structured interview: Takes place after submission and review of an apprentice's report and is conducted at the apprentice's place of work, or other location, agreed by the apprentice's employer and the end-point assessment organisation.

The presentation delivered by the apprentice must not be less than 7 minutes in duration and take no more than 15 minutes; it should allow an apprentice to build and enlarge upon information detailed in their submitted report and against the competence required in the apprenticeship standard and enable the apprentice to give their viewpoint as to how they have developed the required competence within their occupational environment. The presentation is delivered by the apprentice to an assessment panel, composed of an independent assessor contracted/employed by the end-point assessment organisation and the apprentice's employer. The independent assessor will Chair the panel and make the final decision. The panel members may ask the apprentice clarification questions if required, within a maximum 20-minute time period allowed for the presentation and questions.

The end-point assessment organisation will provide guidance regarding the criteria that the presentation seeks to assess, the ways in which the presentation can be delivered, the evidence of competence, and assessment criteria for grading the presentation. This guidance will assist apprentices to focus on the requirements of the presentation and fully prepare for it.

Approved end-point assessment organisations will use the information provided in the appendices to this document to provide guidance and produce information for those involved in the end point assessment process.

The presentation will be graded pass/fail.

A structured interview follows the apprentice presentation, and this will typically last for 45 minutes and no more than 60 minutes. The structured interview is a discussion that:

- Enables an apprentice to discuss and reinforce their marine engineering competence.
- Allows assessors to ask structured questions to determine the candidate's level of competence at the end of the apprenticeship.
- Explores evidence for areas of the standard and competence that are best assessed verbally, for example behaviours, personal development and reflection, etc.
- Allows assessors to clarify or gain more information on areas from their review of the submitted professional report and the presentation given by the apprentice.
- Confirms and validates judgements on how an apprentice has met the requirements of the standard.
- Enables the assessors to draw conclusions on the holistic end point assessment.

The structured questions will cover:

- Company quality processes, procedures and documentation.
- Coverage of the standard.
- Personal development and reflection.

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- Compliance with statutory, organisational and health, safety and environmental regulations while carrying out marine engineering tasks.
- The technical understanding required to undertake marine engineering processes safely and effectively.
- The methods, techniques, tools and equipment used when completing marine engineering tasks.
- Behaviours.

The end point assessment organisation will provide the panel with the following before an apprentice's presentation/ structured interview takes place:

- Candidate submitted report.
- Assessor notes from review of the apprentice's professional report.
- Structured interview brief and questions and relevance of these to the standard and EngTech.
- Structured interview guidance.
- Assessment criteria.
- Recording forms.
- Guidance re assessor's role and responsibilities.
- Any required training to assessors to enable them to undertake the structured interviews and ensure consistency of approach.

The end point assessment organisation will provide templates of structured questions and marking code guidance; also provided will be guidance to apprentices in how to prepare for their presentations and structured interviews.

The outcome from the structured interview will be a pass/fail.

The structured interview will be administered in accordance with the end-point assessment organisation's processes. The structured interview must be led by an assessor appointed by the end-point assessment organisation, along with a representative from an apprentice's employer who form the panel.

The independent assessor will make the final decision, thus ensuring the required level of independence. The overall grading decision (pass/fail) can be initially reached and submitted to the end-point assessment organisation for final moderation and agreement.

The end point assessment methods discussed above enable apprentices to present a cumulative picture of their competence and demonstrate how they have met the requirements of the standard.

### **Roles of those involved during the end point assessment process**

#### Employer:

- Select end-point assessment organisation from those listed on the Register of End-Point Assessment Organisations (RoEPAO) and inform training provider of this.
- Decide whether the apprentice has achieved the competence required to progress through the Gateway and is ready to undertake the end point assessment. Recommended that this is undertaken in discussion with the apprentice, and where appropriate the training provider.
- Liaise with training provider and end-point assessment organisation in the scheduling of an apprentice's end point assessment and releasing apprentices to attend the end point assessment at the appropriate time.

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- Monitor progression of an apprentice and ensure that the apprentice is aware of required assessment dates and submissions. Provide the appropriate marine engineering company's operational business focus, as necessary, for the end point assessment panel.

#### Training provider:

- Support the employer in the training and on-programme assessment of the apprentice, as agreed between employer and training provider and decision for apprentice to progress through required gateways to end point assessment.
- Liaise with the end-point assessment organisation regarding booking the apprentice on to end point assessment, adhering to the end-point assessment organisation's processes regarding notice period for assessment allowing the end-point assessment organisation to plan, schedule and send out required notification for end point assessment dates, etc.
- Play no part in the end point assessment itself.

#### Assessors undertaking the end point assessment on behalf of the end-point assessment organisation:

- Approve title and focus of report.
- Receive and review the apprentice's report submission and decide if this meets with defined end point assessment requirements. Where it does not provide adequate feedback to apprentice and their employer and inform of re-submission requirements.
- Plan, schedule advise apprentices of when and where they will undertake their presentation and structured interview.
- Chair and lead the panel for the presentation and structured interview and make final judgement on the outcome of the end point assessment elements taking into consideration the views of the other panel member.
- Communicate outcome to end-point assessment organisation and complete relevant paperwork, as directed by end-point assessment organisation.
- Contribute to any appeals against end point assessment outcomes, in accordance with the end-point assessment organisation's appeals process.
- Take part in standardisation and moderation meetings/events, as required to ensure consistency of approach across marine engineer apprentices' end point assessment

**Note:** the role and responsibilities of the end-point assessment organisation are detailed later in this document.

#### **Grading – and final judgement**

The results of each of the three end point assessment methods requires independent assessment and judgement. The chair of the structured interview panel (independent assessor) is responsible for the final judgement for the overall grade. Employers are not permitted to make any grading judgements within the end point assessment process. An employer's role is to provide clarification of industry/employer specific processes and context in which the apprentice works.

The final grading is based on the evidence provided by the apprentice during each of the three end point assessment methods undertaken.

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To pass an apprentice must meet all the pass characteristics as detailed in Appendix B.

The decision is to be communicated to the apprentice within four weeks of the final element, the structured interview, taking place and in line with any moderation processes.

A successful pass of the end point assessment leads to final apprenticeship certification.

Where an apprentice does not achieve the overall end point assessment grading requirements (a pass), the end-point assessment organisation will advise the apprentice and their employer on the shortcomings identified during the end point assessment. Apprentices should have a supportive action plan to prepare for any re-sits/re-takes. A re-sit does not require further learning/training, whereas a re-take does. Typically, re-sits/re-takes should be carried out within 3 months of the original end point assessment taking place, and not more than 6 months from the original assessment start date. Where re-sits/re-takes are taken outside the 6-month end point assessment period, then the apprentice will need to re-sit/re-take all elements of the end point assessment. An end-point assessment organisation at their discretion can lengthen the re-sit/re-take submission date, for example where there have been scheduling issues.

Any appeals regarding the outcome of the end point assessment grading will be dealt with in accordance with the end-point assessment organisation's stated appeals policy.

### **Ensuring independence**

Any organisation that wishes to undertake apprenticeship assessment needs to be registered on the Register of End-Point Assessment Organisations (RoEPAOs) and meet the requirements of the register.

Independence and impartiality is achieved during the end point assessment by the end-point assessment organisation appointing assessors who are independent of apprentices and their employers.

Approved end-point assessment organisations will be responsible for the recruitment and performance of the independent assessors who will conduct the marine engineer end point assessments. Independent assessors will review the outcomes from all end point assessment methods and decide if the apprentice has met the competence required by the standard and award a pass or fail grade.

The content and structure of the end point assessment methods, including all guidance, grading criteria and other relevant documentation will be provided by the respective end-point assessment organisation, and all end-point assessment organisations will be required to take part in moderation exercises to ensure consistency of approach across all apprentices.

### **Internal quality assurance of end point assessment**

End-point assessment organisations will have their own quality assurance systems and processes that support fair, reliable and consistent assessment across organisations and over time.

Moderation and standardisation must form part of the end-point assessment organisation's internal quality assurance. It is expected that as a minimum, this will include the following:

- Having staff undertaking moderation duties to have appropriate knowledge and experience of the organisation's quality assurance process and received training in the QA role.

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- Staff undertaking moderation duties to undertake continuous professional development (CPD) of at least 3 days each year, this to include review of assessment plan requirements and changes to the marine engineering technical areas, etc., which are documented and reviewed.
- The decisions of the independent assessors used by the end-point assessment organisation to be monitored with at least a minimum of 60% of assessments being moderated for inexperienced assessors or for those where previous judgements have been questioned, at least 20% for more experienced industry assessors.
- Regular standardisation meetings being held with independent assessors being required to attend at least bi-annually.
- Statistical analysis providing breakdown of key performance indicators of assessors.
- A documented appeals policy that is widely communicated and accessible.
- Escalation policies and reporting to the external quality assurance body (Ofqual).

The end-point assessment organisation must ensure that all assessment methods produce assessment outcomes that are consistent and reliable, allowing fair and proper comparison between apprentices employed in companies of different types and sizes.

### **End Point Assessment Organisation responsibilities**

The general responsibilities of an end-point assessment organisation are summarised below:

- Provide completely independent view to the end point assessment.
- Take responsibility for an apprentice's end point assessment experience once the end point assessment process has been initiated.
- Have robust documented processes and resources for the delivery of end point assessments (tracking, communication, scheduling, recording, standardisation, process flows, quality assurance, etc).
- Develop and offer full range of standard end point assessment tools and materials and offer a range of supporting documentation and templates to apprentices, employers, and assessors to assist in end point assessment preparation, submission and delivery.
- Appoint independent assessors to review material submitted ahead of the presentation and structured interview.
- Appoint and approve sufficient assessors to manage and conduct end point assessment ensuring that those appointed are experienced and qualified in the assessment profession and have recent experience in marine engineering with at least a Level 3 marine engineering qualification and can demonstrate continuous professional development over the previous 5 years in relevant industry area. Brief and provide training to assessors and provide assessors with supporting information to help ensure that assessments are made consistently against the end point assessment requirements.
- Plan, schedule, organise apprentices' end point presentations and structured interviews, ensuring sufficient geographical coverage across England and regularity to fit demand from apprentices and their employers. Structured interview appointment slots should be allocated to apprentices on demand and usually 6 weeks in advance.
- Provide detailed guidance to employers and training providers about the end point assessment booking process.
- Undertake standardisation and moderation and quality assurance activity to ensure consistency in results both internally and externally.

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- Have an appropriate appeal process to cater for issues arising from end point assessment and communicate this to interested parties.
- Regularly review and make available details of end point assessment costs.
- Work collaboratively to ensure consistency, using cross standardisation and bench marking.

### **Implementation**

The end-point assessment organisation will produce clear specifications and guidance for each element of the end point assessment.

In developing the assessment approach, the employer group has prescribed assessment methods that enable apprentices to demonstrate their competence whilst ensuring that marine engineering businesses are comfortable with the administrative and time requirements required by the end point assessment processes.

The employer group will continue to work closely with those involved in the development and delivery of the training and assessment to learn from experience and to identify any required remedial actions and share best practice.

The approach to development and implementation will continue to be informed by close consultation with end-point assessment organisations, training providers, awarding organisations and professional bodies, as well as assessment specialists.

### **Affordability**

The practicality and robustness of the assessment has been a key consideration in the development of this assessment plan.

Elements of the end point assessment are portable and may be conducted at a range of sites. Apprentice presentations and structured interviews may be conducted at employer sites where there are sufficient numbers of apprentices undergoing end point assessment, and a host employer's premises where there is insufficient numbers to hold at each individual employer's location. The location of these elements of the end point assessment will incur some additional costs, but the end-point assessment organisation should seek to minimise these where possible and factor these costs into overall costings provided and negotiated with employers/training providers.

### **Professional body recognition**

The Institute of Marine Engineering Science and Technology (IMarEST) is supportive of the marine engineer standard and assessment plan. The scope of the standard and the assessment plan is such that a person completing a marine engineer apprenticeship standard should receive robust on and off the job training and acquire competence necessary to apply for professional registration such as EngTech should they wish to.

### **Appendices**

A	Marine Engineer assessment method matrix
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B	Grading descriptors
C	Mapping requirements of standard to selected assessment method methods matrix

## Appendix A – End point assessment methods matrix

**Key: R = Professional Report, P = Presentation, I = Structured Interview**

Core knowledge and understanding to be assessed		Method of assessment		
CK1	Companies place within the marine industry		P	I
CK2	The implementation of health and safety and environmental legislation and regulations	R	P	I
CK3	Sources of information that are available and should be referred to/adhered to when assembling/removing/overhauling/installing/ refitting marine engineering components, sub-assemblies, and systems	R	P	I
CK4	How to respond to the various needs of internal and external customers	R		
CK5	The principles and characteristics of different marine engine systems and ancillary systems, components, and operations	R		I
CK6	The work methods and environment in which marine engineers must operate	R	P	I
CK7	The means and methods for planning and setting up of marine engineering work tasks	R		
CK8	The range of tools, equipment and machinery used when undertaking marine engineering tasks and their characteristics	R		
CK9	Options and constraints during installation /maintenance of marine engines and marine ancillary systems and components	R		
CK10	Ways of ensuring quality of marine engineering processes and work products	R		I
CK11	Types of documentation	R		

Core skills to be assessed		Method of assessment		
CS1	Plan for marine engineering work and tasks that need to be undertaken	R	P	
CS2	Prepare for marine engineering work and tasks to be undertaken in appropriate time and manner ensuring work space is adequate and correct equipment, tools and materials are selected	R	P	I
CS3	Demonstrate full awareness and take responsibility for health and safety, environmental and other relevant legislation, regulations and codes, and other work procedures and policies, etc.	R	P	I
CS4	Solving marine engineering manufacturing non conformance	R		

CS5	Install/maintain marine engines and marine ancillary systems and components using appropriate methods, tools and equipment	R	P	I
CS6	Support commission/test/sea trials to ensure marine engineer systems and components meet required operational standards and are free from defects	R	P	
CS7	Complete required documentation and company protocols	R		

Core behaviours be assessed		Method of assessment		
CB1	Apply appropriate safety behaviours individually and towards others	R		I
CB2	Demonstrate commitment to quality, profitability and continuous improvement	R		I
CB3	Demonstrate commercial and market awareness and business acumen			I
CB4	Focus on the requirements of the customer (both internal and external)	R		I
CB5	Communicate effectively in a variety of ways with both internal and external colleagues and customers using appropriate methods and language	R	P	I
CB6	Be punctual, reliable, diligent, showing motivation to undertake tasks and reliability in completing them			I
CB7	Be diligent and respectful towards customers, peers and colleagues showing an appreciation for equality and diversity			I

## Appendix B – Assessment grading descriptors

Apprentices need to meet all pass characteristics to successfully complete the end point assessment. Details of both pass and fail characteristics are shown below for each assessment method.

### Professional report

The following descriptors are indicative of a fail:

- The report lacks sufficient evidence to demonstrate knowledge, understanding, skills and competence; the report lacks one or more of the requirements of Appendix A.
- The skills evidenced in the report lack a methodical approach as listed in the Marine Engineer Standard.
- A poor understanding of marine engineering principles and process flows is shown.
- Poor reasoning for actions and decisions taken.

The following descriptors indicate pass characteristics:

- The professional report is completed in a timely and accurate fashion.
- The professional report is completed within the required wordage guidelines.
- The content of the professional report is organised and well structured, using an appropriate referencing system demonstrating that the apprentice has read and understood the report brief and associated guidance.
- The content of the professional report uses appropriate and accepted marine engineering terminology and correctly ordered processes.
- The report provides detailed information of correct marine engineering processes and principles.
- The report contents demonstrate elements of confident problem solving in undertaking marine engineering work aspects.
- The apprentice has demonstrated a range of skills to realise the report's intended outcomes.
- The apprentice has given thought to problems encountered and how to overcome these.
- The apprentice has used good reasoning skills to present information.
- Communication skills have been used effectively to present outcomes and conclusions in an appropriate format.
- The content of any supplementary information provided has relevance to the professional report and adds value to the body of the report.
- The report and any supplementary information provided demonstrates the required areas of competence of the standard, as highlighted in Appendix A have been met.

### Apprentice presentation

The following is indicative of a fail:

- The apprentice fails to provide sufficient evidence to meet the standard's knowledge, skills and behavioural evidence; the presentation lacks one or more of the requirements of Appendix A.

- The presentation lacks a methodical approach as listed in the Marine Engineer standard.

The following descriptors indicate the level of attainment characteristic of a pass:

- Apprentice has demonstrated good understanding of the requirements of the presentation and shown good planning.
- Can explain the main factors impacting on the marine engineering industry.
- Demonstrates good understanding of safe working practice with due regard to the appropriate health and safety and environmental legislation and regulations.
- Demonstrates good knowledge and understanding and application of the marine engineering environment including key principles, practices and legislation affecting the different marine engineering work aspects.
- Can demonstrate marine engineering skills relevant to the different work aspects to a good standard of accuracy and precision.
- Shows a good awareness of marine engineering concepts, processes and methods.
- Uses marine engineering language and terminology confident and in the right context.

### **Structured interview**

The following is indicative of a fail:

- Fails to provide sufficient evidence to meet knowledge, skills and behaviour evidence; fails to provide one or more of the requirements of Appendix A.

The following descriptors indicate the level of attainment characteristic of a pass:

- Provides correct information to describe their understanding of skills, knowledge and behaviours required to undertake their role competently.
- Uses appropriate marine engineering theories and principles in context.
- Adopts appropriate safety behaviours.
- Justifies their approach in undertaking marine engineering activities and the work processes adopted in achieving successful outcomes.
- Correctly explains how to source and interpret relevant information for planning and progressing marine engineering tasks.
- Recognises and defines problems associated with their job and suggests ways these can be effectively resolved.
- Demonstrate how they have worked effectively with others in undertaking marine engineering tasks or in resolving marine engineering problems.
- Recognises and selects appropriate courses of action from a range of scenarios illustrating appropriate behaviours (as detailed in standard).

### Appendix C – Mapping requirements of standard to selected assessment method methods matrix

Work Aspects	Skill – the marine engineer will be able to:	Knowledge and Understanding – the marine engineer will know and understand:	Mapped to assessment method matrix
Respond appropriately to customer needs (internal and external)	<ul style="list-style-type: none"> <li>• Prepare for meetings and discussions</li> <li>• Communicate marine engineering principles, concepts and processes relevant to the customer using appropriate listening, questioning, non-verbal communication, recording and presentation techniques</li> <li>• Use appropriate marine and engineering terminology</li> <li>• Make recommendations to ensure optimal performance of boats and yachts</li> </ul>	<ul style="list-style-type: none"> <li>• National and international marine industry and the company's place within it</li> <li>• Types of customers and their typical marine engineering needs</li> <li>• How marine engineers interact with and support other marine trades</li> <li>• Role of formal and informal communication</li> <li>• Marine engineering terminology</li> <li>• Use of information technology in marine engineering</li> <li>• Costing, pricing and budgeting principles</li> </ul>	<p>CK1, CK4, CK6, CK10</p> <p>CS1, CS4</p> <p>CB2, CB3, CB4, CB5, CB6, CB7</p>
Work methods and environment	<ul style="list-style-type: none"> <li>• Comply with quality, health and safety and environmental regulations related to the marine industry</li> <li>• Prepare the work area in order to conduct marine engineering activities</li> <li>• Select, use, maintain and store equipment and tools</li> <li>• Follow and maintain work procedures, method statements and production records</li> <li>• Work efficiently and effectively</li> <li>• Consider sustainability and environmental impacts when making, safety, quality and cost decisions</li> <li>• Use mathematical techniques, formulae, and calculations in marine engineering processes</li> </ul>	<ul style="list-style-type: none"> <li>• Requirements and practices for working safely and ensuring the health and safety of themselves and others in the work environment</li> <li>• Safe efficient methods of assembly/use/maintenance/movement/protection and storage of materials, tools, equipment</li> <li>• How to produce and interpret scaled engineering drawings plus any certification requirements</li> <li>• Types and uses of work procedures, method statements, production records and manufacturer's manuals and specifications</li> <li>• Characteristics and reaction of materials to their environment: temperature, humidity, pressure</li> <li>• Mathematical techniques, formula, and calculations that underpin marine engineering</li> <li>• Requirements and principles for ensuring quality and continuous business improvement</li> </ul>	<p>CK2, CK3, CK6, CK7, CK8, CK9, CK10, CK11</p> <p>CS2, CS3, CS5</p> <p>CB1, CB2, CB3, CB4, CB5, CB6, CB7</p>

Planning and set up	<ul style="list-style-type: none"> <li>• Design layout of marine system or components</li> <li>• Interpret designer's plans and engineering data, drawings and documentation</li> <li>• Finalise time and cost of the work to be done</li> <li>• Select/maintain/store appropriate equipment and materials</li> <li>• Select/make/use appropriate engineering jigs, templates and tooling</li> <li>• Select and use calibrated and measuring engineering tools</li> <li>• Select, source and use a variety of precision data charts and reference tables</li> <li>• Practical and safe use of tools, materials and equipment</li> <li>• Safe use of jigs, templates and tooling</li> </ul>	<ul style="list-style-type: none"> <li>• Company's process for design, planning and set up</li> <li>• How to obtain the required correct engineering data, specifications and documentation using selected procedures</li> <li>• Principles underpinning technical engineering documentation, the roles and safe and efficient use of fixed and rotating components</li> <li>• How to use tools, materials and equipment safely</li> <li>• Calibrated tools and measuring equipment and their uses</li> <li>• Vessel design and construction, complex shapes</li> <li>• Sourcing of components, bill of materials methodology and reporting discrepancies and quality issues</li> <li>• Relationship between systems and efficient use of space</li> <li>• Feedback and / or change process (red line) drawings and specification errors or modifications required</li> </ul>	<p>CK2, CK3, CK5, CK6, CK7, CK8, CK9, CK10, CK11</p> <p>CS1, CS2, CS3, CS4, CS7</p> <p>CB1, CB2, CB3, CB4, CB5, CB6, CB7</p>
Install and maintain marine engines and marine ancillary systems and components	<ul style="list-style-type: none"> <li>• Measure and mark out to carry out precision machining and hand fitting processes</li> <li>• Use hand tools to cut, drill, shape and finish components to tolerances</li> <li>• Move components using appropriate safe methods and equipment</li> <li>• Assemble, remove, overhaul and refit marine engineering components, sub-assemblies and systems using appropriate machinery, equipment, tools and materials</li> <li>• Check /inspect components for robustness, fit and tolerances</li> <li>• Shape, fabricate, and manipulate and precision alignment of marine engineering components and materials to accepted tolerances</li> <li>• Conduct/undertake planned or routine maintenance to required specification</li> <li>• Check/test/diagnose marine engineering components to company and manufacturing standards</li> </ul>	<ul style="list-style-type: none"> <li>• Principles of 2 and 4 stroke petrol and diesel engines and their operation</li> <li>• Principles of boat ancillary systems - propulsion</li> <li>• How marine engineering systems relate to each other</li> <li>• Appropriate uses of measuring aids and equipment</li> <li>• Basic principles of contingency planning and problem solving</li> <li>• Options and constraints during installation/ maintenance of marine engineering systems and components</li> <li>• Working within confines of complex shapes and curves</li> <li>• Appropriate use of tools, equipment and machinery</li> <li>• Appropriate use of fixing techniques: mechanical fastenings, welding, adhesives</li> <li>• Storing marine engineering components safely</li> <li>• Methods of disassembling and repairing, refitting engineering components</li> <li>• Service and maintenance requirements: engine servicing and winterisation</li> <li>• How to inspect, diagnose, record and rectify defects or faults</li> <li>• New and traditional engineering and electrical technologies</li> </ul>	<p>CK2, CK3, CK5, CK6, CK8, CK9, CK10</p> <p>CS3, CS4, CS5, CS7</p> <p>CB1, CB2, CB4, CB5</p>



	<ul style="list-style-type: none"> <li>• Complete required organisational and manufacturer's documentation</li> </ul>	<ul style="list-style-type: none"> <li>• Importance of safe waste handling and disposal in line with statutory and company policies</li> </ul>	
Support commission, test and sea trials	<ul style="list-style-type: none"> <li>• Apply safe and social responsibility practices when working at sea</li> <li>• Check installation meets required operational standards and is free from defects</li> <li>• Commission and test system</li> <li>• Complete necessary documentation and company protocols</li> <li>• Undertake basic crew roles</li> </ul>	<ul style="list-style-type: none"> <li>• Manufacturers' specifications and requirements</li> <li>• Classification definition, types and regulations/requirements, including Maritime and Coastguard Agency</li> <li>• Statutory and regulatory regulations for basin and sea trials</li> <li>• Principles of safe working practices for working on or near water</li> <li>• Different types of documentation; trials checklist, engine sea trial report</li> </ul>	CK2, CK3, CK5, CK6, CK8, CK10, CK11, CS6, CS7
Behaviours	<ul style="list-style-type: none"> <li>• Appropriate safety behaviours individually and towards others</li> </ul>		CB1
	<ul style="list-style-type: none"> <li>• Commitment to quality, profitability and continuous improvement</li> </ul>		CB2
	<ul style="list-style-type: none"> <li>• Commercial and market awareness and business acumen</li> </ul>		CB3
	<ul style="list-style-type: none"> <li>• Focus on the requirements of the customer, internal and / or external</li> </ul>		CB4
	<ul style="list-style-type: none"> <li>• Work effectively individually and as party of a team and to communicate with all levels of the organisation</li> </ul>		CB5
	<ul style="list-style-type: none"> <li>• Strong work ethic including being motivated, committed, meticulous, reliable, proactive and adaptable</li> </ul>		CB6
	<ul style="list-style-type: none"> <li>• A recognition and appreciation of equality and diversity in the workplace</li> </ul>		CB7