

ASSESSOR'S MANUAL FOR CONDUCTING MARINER ASSESSMENTS

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CONDUCTING MARINER ASSESSMENTS: A PRACTICAL MANUAL FOR ASSESSORS

Introduction

The STCW Challenge

Recent enactment of the *Seafarers' Training, Certification and Watchkeeping (STCW) Code* by the *International Maritime Organization (IMO)* has led to new requirements in conducting assessments of mariner proficiency. The STCW Code identifies a broad set of proficiency areas comprised of skills, knowledge, and abilities. It further directs maritime industries in its member nations to assess mariner proficiency in selected areas on the basis of practical demonstration. Assessors will be responsible for administering assessments to mariners and ensuring that valid and reliable results are obtained.

The Role of the Assessor

As an assessor, you will be responsible for assessing the ability of candidates to perform a task, duty, or responsibility properly. You will use established criteria and your professional judgment to determine whether the candidate has demonstrated an acceptable level of proficiency. You will use assessment procedures that have been carefully developed, reviewed, and approved prior to the assessment. You should personally observe the mariner's performance and determine the outcome of the assessment.

An assessor should hold the level of license, endorsement, or professional credential required for the proficiency being assessed. In addition, the assessor should review the assessment materials and receive a basic introduction to techniques and issues associated with assessing mariner proficiency through practical demonstration.

Purpose of Manual

The purpose of this manual is to provide assessors with guidelines for conducting valid and reliable mariner assessments based on practical demonstration. This manual is not intended to provide comprehensive instruction in the full range of assessment issues. Rather, it is intended as a focused introduction and reference to selected factors that affect validity (job criticality) and reliability (consistency) while conducting such assessments.

The process and guidance presented in this manual conform to international standards and domestic regulations, especially the IMO's STCW Code and the U.S. Coast Guard's Navigation and Vessel Inspection Circulars (NVICs) that address implementation of the STCW Code within the United States. The reference section of this manual lists specific STCW documents, applicable NVICs, and other source documents that can be referred to for more detailed guidance in developing and conducting mariner assessments based on practical demonstration.

Components of an Assessment Procedure

Any assessment procedure that is designed to meet IMO and U.S. Coast Guard requirements for practical demonstration of mariner proficiency will typically be comprised of several common components: *assessment objectives*, *assessment conditions*, *performance measures*, *performance standards*, and *scoring procedures*. As an assessor, you should familiarize yourself with these components, referring to the specific assessment procedures you will be using.

When conducting an assessment, you will evaluate a candidate's ability to meet pre-defined *assessment objectives*. These objectives can be derived from the STCW Code and U.S. regulations, as well as technical manuals, job instructions, textbooks, and task analyses. Each assessment objective consists of one or more separate actions. An example assessment objective from a Lookout assessment is "describe lookout duties and responsibilities." As part of this objective, the candidate must demonstrate knowledge of the procedures for reporting sightings, including identifying and describing the procedure and reporting all relevant information. An example objective from a Prepare Main Engine for Operation assessment is "perform engine auxiliaries pre-start checks." To meet this objective, one action the candidate must perform is to determine the status of the main engine controls and ensure that they are appropriate for starting the main engine.

The candidate's performance on the stated assessment objectives will be evaluated under various *assessment conditions*. Conditions for the Lookout assessment, for example, include the presence of appropriate targets to be sighted, clear visibility during daylight and at night, and restricted visibility. The assessment conditions will be explicitly defined in the assessment procedures.

Each assessment objective will have one or more corresponding sets of performance measures and performance standards. *Performance measures* include observation and recording of specific mariner actions, or the outcome of those actions. Table 1 below provides a sample of mariner actions, performance measures, performance standards, and a scoring checklist from a Helmsman assessment procedure. It shows three of the five actions for the assessment objective "Demonstrates use of magnetic and gyro compasses in open waters." The first performance measure in this table is "Report of compass comparison," which is measured when assessing the action "Compare and report course by gyro and magnetic compass after a course change." Here, the assessor is required to record the mariner's report of the compass comparison, then apply the corresponding performance standard.

Performance standards specify the level of performance that is considered an acceptable or target level. Continuing with the example in the first row of Table 1, there are two performance standards that are to be applied in scoring the corresponding performance measure. In this case, the mariner is required to both (1) make a report after the course change and (2) provide a reported magnetic reading that is ± 2 degrees of actual.

Scoring procedures are used in scoring individual actions, as well as sets of scores to determine the outcome of performance assessments. Both of these types of scoring procedures should be explicitly defined in the assessment procedures. Pass/fail is the most common scoring procedure for individual actions. In this case, a candidate obtains a passing score for an action by passing all performance standards corresponding to that action. Scoring procedures applied to sets of multiple scores will most commonly be based on some range of acceptable scores. However,

assessments often involve critical objectives that must be passed or the candidate fails the entire assessment. For example, a candidate undertaking an assessment of his ability to start the main engine must be able to correctly place the emergency stop valve in the run position. This action is essential to safe job performance, so a candidate must be able to perform it to pass the assessment.

Table 1. Example of Actions, Performance Measures, and Performance Standards from the Helmsman Assessment

Action	Performance Measure	Performance Standard	Score
Compare and report course by gyro and magnetic compass after a course change.	Report of compass comparison.	<p>Performance meets all standards:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Report after course change. <input type="checkbox"/> Reported magnetic reading to be +/- 2 degrees of actual. 	<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A
Compare and report course by gyro and magnetic compass periodically.	Report of compass comparison.	<p>Performance meets all standards:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Report at the time interval specified in the standing orders or company policy. <input type="checkbox"/> Comparison of gyro and magnetic compass to be unprompted by assessor/watch officer if consistent with company procedures. <input type="checkbox"/> Reported magnetic reading to be +/- 2 degrees of actual. 	<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A
Steer by magnetic compass in moderate weather.	Maintain a steady course.	<ul style="list-style-type: none"> <input type="checkbox"/> Course to be maintained at +/- 5 degrees of ordered course for 30 minutes, relying solely upon the magnetic compass. <p>In adverse winds or current, allowance can be made for a less stringent standard.</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A

Overview of the Assessment Process

You should follow the same basic series of five steps in conducting an assessment, even if you are conducting assessments of a number of mariner proficiencies. The first step is to prepare for the assessment by reviewing and ensuring the required assessment conditions and scheduling the assessment at an appropriate time (e.g., at night for certain Lookout objectives). The second step is to brief the candidate before the assessment. This involves verifying the candidate's readiness to undertake the assessment and then briefing the candidate on the assessment objectives, measures, standards, and scoring. The third step involves observing the candidate's performance during the assessment and recording the results. For the fourth step, the assessment outcome is determined by scoring each performance measure and tallying the scores across objectives. The fifth and final step is to debrief the candidate following the assessment. Figure 1 depicts the steps involved in conducting an assessment.

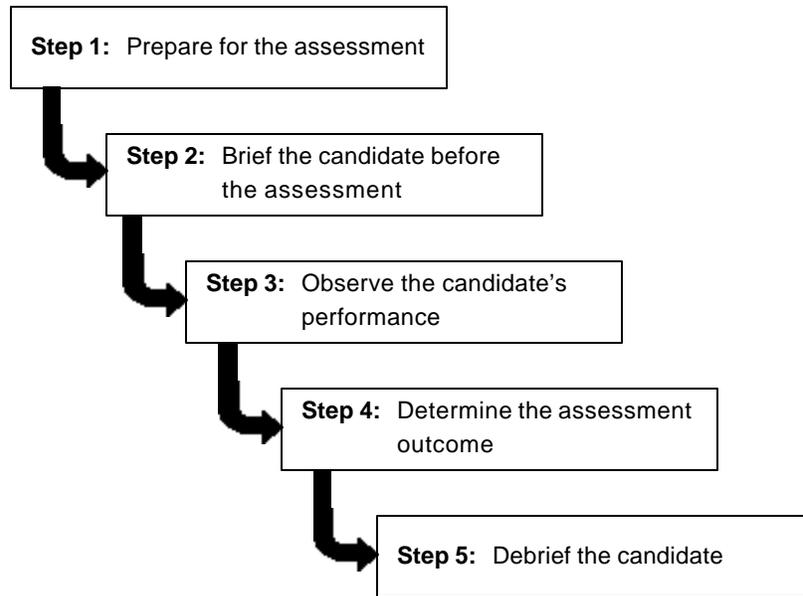


Figure 1. Steps involved in conducting mariner assessments based on practical demonstration.

The remainder of this manual consists of guidelines for conducting mariner assessments. The guidelines are organized around the five steps involved in conducting mariner assessments. At each step, guidance is provided regarding factors to consider in preparing for and conducting assessments, followed by a general checklist of issues to consider.

Guidelines for Conducting Mariner Assessments

As an assessor, you should always strive to conduct valid and reliable assessments. An assessment is *valid* when it accurately measures the job-critical knowledge, skills, and abilities required for proficient job performance. An assessment is *reliable* when it consistently obtains the same results across mariners with comparable skills.

How do you know if you are prepared to conduct a valid assessment that will accurately measure the job-critical knowledge, skills, and abilities required for proficient job performance?

Your assessment will be valid if the conditions of assessment reasonably reflect a representative range of working conditions and requirements. Some questions you should consider in determining whether you are prepared to conduct a valid assessment are listed below.

- Will the assessment be conducted under realistic working conditions that adequately assess the mariner's abilities to perform his or her duties on the job?
- Will the mariner be required to demonstrate the skills and knowledge that are identified in the assessment as critical to proficiency?
- Will the mariner be required to rely on his or her own skills and knowledge?

How do you know if you are prepared to conduct a reliable assessment that will consistently obtain the same results across mariners with comparable skills?

Your assessment will be reliable if you carefully follow prescribed assessment procedures that are designed to ensure consistent results from one assessment to the next. Some questions you should consider in determining whether you are prepared to conduct a reliable assessment are listed below.

- Have you reviewed the instructions in the assessment package to ensure that you are prepared to carefully follow prescribed assessment procedures?
- Will you provide the candidate with a complete set of instructions and answer any appropriate questions that he or she may have?
- Are you prepared to accurately observe and record all mariner performance, as instructed in the assessment package?

Step 1: Prepare for the Assessment

Ideally, you should begin preparing for an assessment several days before it is scheduled. The first activity is to coordinate the assessment with the candidate(s) to ensure that they are properly prepared and qualified to take part in the assessment. Each assessment procedure should specify candidate prerequisites for assessment, in terms of prior training, experience, licenses, and successful completion of other related assessments. If these are absent, they should be discussed and established by those responsible for assessment in your organization. You should verify that a candidate meets all prerequisites for an assessment. In addition, you should determine that a candidate is scheduled to be onboard for an adequate period of time to complete the assessment, which will range from an hour to days or weeks, depending upon the specific assessment procedures.

The second activity involved in preparing for the assessment is to consider and plan for the required conditions. Carefully read the assessment conditions listed in the assessment procedures. Prior to conducting an onboard assessment, check your passage plan to determine when the required conditions might be present. Plan to schedule your assessment to match the availability of these conditions, if possible. Common conditions that can often be planned for in advance are being underway at sea, maneuvering in restricted waters, or being moored. Other conditions, such as restricted visibility or heavy seas, cannot be planned for in advance and can only be taken advantage of when the conditions arise. When you have prepared a schedule, inform the candidate(s), the relevant watch officer(s), and other personnel of the date and time(s) of the assessment so that they can plan their activities accordingly.

The third preparatory activity is to check all equipment required for the assessment and ensure that it is operational and available. The assessment procedures should specify the equipment required to assess a particular proficiency. If an engineering assessment involves checking equipment status, make sure you know the normal range for each variable and record this information so that you can refer to it during the assessment. As part of your check of equipment, you should also review all applicable safety precautions and procedures to ensure full adherence to them.

General Checklist for Assessment Preparation

- ❑ Gather and review all assessment materials.
- ❑ Verify that the candidate meets the assessment prerequisites.
- ❑ Check the candidate's duty schedule.
- ❑ Ensure that the appropriate conditions will be present for the assessment.
- ❑ Schedule the assessment and inform all affected personnel.
- ❑ Prepare the assessment area(s).
- ❑ Prepare and arrange the necessary equipment, and ensure that it is operational.
- ❑ Determine the necessary safety precautions.

Step 2: Brief the Candidate before the Assessment

The pre-assessment briefing should take place at least one day prior to the assessment (earlier if at all possible). This will help both you and the candidate to be well prepared for the assessment. During this briefing, you should provide the candidate with a copy of the Candidate Instructions and Assessment Control Sheet. The *Candidate Instructions* are instructions prepared especially for the candidate, focusing on the issues that will be of concern to that individual. The *Assessment Control Sheet* summarizes the assessment objectives and all of the actions required for each objective. It is also the document on which you will record the candidate's final scores for each objective.

Begin the briefing with a discussion of the candidate's prior experience, training, and qualifications. At this time, you should verify that this candidate is both qualified and willing to undertake the assessment. If you both agree the candidate is ready for the assessment, then continue with the assessment process. If not, arrange for additional on-the-job or simulator training and set a date for another review of the candidate's qualifications.

Review the conditions of the assessment with the candidate. Specifically, discuss the different operational conditions under which assessment will occur. You should also discuss the period of assessment. Some assessments can be completed in a single, relatively brief period of time. Other assessments require repeated observation, taking advantage of available conditions, such as restricted visibility, as they occur.

Safety is of paramount concern during the assessment. Because of this, you should remind the candidate that it is permissible to ask questions during the assessment. This can help to reduce the risk of an unsafe act during the course of the assessment. For all assessments, ensure that the candidate has the proper equipment to carry out the assessment. Inform the candidate that an assessment will be stopped at any time if you, the assessor, judge that safety conditions are being violated for any reason.

General Checklist for Briefing the Candidate before the Assessment

- ❑ Provide the candidate with copies of the *Candidate Instructions* and *Assessment Control Sheet*.
- ❑ Discuss the candidate's readiness for the assessment.
- ❑ Review the *Candidate Instructions* with the candidate and answer any questions.
- ❑ Discuss the desired outcome(s) and consequences of failing to perform part or all of the assessment.
- ❑ Advise the candidate of the conditions and schedule of the assessment.
- ❑ Review the circumstances under which the assessment will be terminated, due to safety concerns.

Step 3: Observe the Candidate's Performance

The third step in the assessment process is to observe the candidate's performance during the assessment. Remember that you must continuously observe the candidate. Throughout the assessment, require the candidate to adhere to standard procedures, except when assessment procedures require demonstration of knowledge or skills different from those standard procedures. For example, a company may use points to report sightings, but a candidate may also be asked to demonstrate knowledge of the relative bearing system as part of the Lookout assessment.

Specific assessment objectives, performance measures, performance standards, and scoring procedures will be included in each assessment. Your consistent application of these procedures will ensure that you conduct a valid and reliable assessment. However, adherence to these procedures may require some flexibility on your part. Specifically, in some cases you may be required to remember the performance of the candidate for some time before you are able to record and score his or her performance. In addition, there may be times during the assessment when you will need to ask the candidate what he or she is doing. You should try to limit your questions during the candidate's performance, so that you minimize the amount of coaching the candidate receives from you.

Typically, an assessment will include a number of questions regarding the candidate's knowledge of rules and procedures pertaining to the duties under assessment. In addition, there will commonly be a number of questions regarding the candidate's performance that must be asked for clarification. Generally, a good time to ask all of these questions is following the candidate's demonstration of practical skills. At this point, you can ask specific questions you have about the performance you observed and use these questions as introductions, when appropriate, to more general questions about knowledge and rules included as part of the assessment.

Remember that, in order to maintain assessment validity and reliability, candidates should be assessed on their ability to perform their job tasks and duties and to demonstrate their knowledge of job procedures and rules. Avoid training candidates to successfully complete an assessment rather than proficiently perform their job. Also avoid allowing candidates to observe

assessments of other mariners when this will provide them with an unfair advantage during subsequent assessment.

Finally, it is important to remain constantly vigilant regarding operational effectiveness and safety. Assessments should be conducted only where they do not adversely affect the normal operation of the ship. In addition, assessments must be terminated whenever safety conditions are being violated.

General Checklist for Observing the Candidate's Performance

- ❑ If a safety violation occurs, terminate the assessment immediately.
- ❑ Ensure that the candidate can concentrate on the task at hand.
- ❑ Do not allow other crewmembers to interfere with the assessment.
- ❑ Ensure realistic assessment conditions with a normal working environment.
- ❑ Continuously observe the candidate during the assessment. Record the observed performance and apply the performance standards as soon as practical during the assessment.
- ❑ Require that standard procedures be adhered to, except when assessment procedures require demonstration of knowledge or skill different from these procedures.
- ❑ Avoid asking leading questions. Try to keep your questions fair but general in nature.
- ❑ Avoid giving the candidate unsolicited assistance, but respond to appropriate questions and provide appropriate equipment when required.
- ❑ Remain objective and maintain positive control of the operation at all times.

Step 4: Record Results and Determine Assessment Outcome

The fourth step in the assessment process is to determine the assessment outcome. To do this, record the candidate's performance on each *Assessment Worksheet* and then apply the scoring procedures specified in the assessment procedures. Remember that if the candidate incorrectly performs any of the critical, required actions, he or she automatically fails the entire assessment. Finally, determine and document the outcome of the assessment, transferring the final results to the *Assessment Control Sheet*.

You will probably have some additional paperwork requirements that have been specified by your organization. This will likely involve the maintenance of personnel records within your organization. In addition, upon successful completion of an assessment by a candidate, you will need to make the appropriate entries in the *Training Record Book* that has been adopted by your organization as a means of documenting fulfillment of the corresponding STCW requirements by the mariner.

General Checklist for Determining Assessment Outcome

- ❑ Record performance on the appropriate *Assessment Worksheet*.
- ❑ Strictly adhere to the prescribed performance standards and scoring procedure(s).
- ❑ Determine and document the outcome of the assessment, then transfer the final results to the *Assessment Control Sheet*.
- ❑ Attest to successful demonstration of tasks in the *Training Record Book* (TRB) or other record, as appropriate.

Step 5: Debrief the Candidate

The fifth and final step in the assessment process is to debrief the candidate as soon as possible after the assessment. During this debriefing, you should restate the assessment objectives and discuss the candidate's performance on each objective. A good strategy for beginning a debriefing is to review the candidate's positive accomplishments. The candidate will then likely be in a better frame of mind to hear any comments regarding areas needing improvement.

If the candidate failed to demonstrate proficiency, you may work together with him or her to develop an improvement plan to prepare for reassessment. Conditions for conducting reassessments should be specified in the assessment procedure. If these are absent, they should be discussed and established by those responsible for assessment in your organization. Specific issues to consider are: (1) the period between initial assessment and reassessment, and (2) any changes in the performance standards and scoring procedures that are adopted for reassessment.

General Checklist for Debriefing the Candidate

- ❑ Debrief the candidate as soon as possible after the assessment.
- ❑ Restate the assessment objective(s).
- ❑ Focus on positive accomplishments first.
- ❑ Identify areas needing improvement.
- ❑ If the candidate failed to demonstrate proficiency, jointly develop an improvement plan to prepare for reassessment.

GLOSSARY

Assessor. Anyone who conducts an assessment or evaluation of an individual's proficiency. The term *assessor* is used in many discussions of STCW requirements, including the STCW Code and NVIC 4-97 on company roles and responsibilities. The term *designated examiner* is used for *examiner* in the United States implementing regulations.

Assessment. The process of evaluating whether an individual's performance meets established *proficiency criteria*. The terminology used for this process in the United States implementing regulations includes *examination* for knowledge, and an *assessment* based on *practical demonstration*, as witnessed by a *designated examiner*.

Assessment Conditions. The *assessment conditions* define the setting, tools, references, aids, and safety precautions that are required for an assessment of a candidate's proficiency.

Assessment Objectives. The goals for the performance-based assessment of proficiency based on the knowledge, skills, and abilities required by the job. A complete *assessment objective* description includes the required mariner performance, the conditions of assessment, and the standards of performance for successful accomplishment of the objective.

Assessment Procedures. The activities that are conducted in administering the assessment of a candidate's proficiency. The term *assessment procedure* can describe either the actions taken or the written instructions and activity descriptions that are used in conducting an assessment.

Designated Examiner. A person who has been trained or instructed in techniques of training or *assessment* and is otherwise qualified to administer performance assessment procedures. In practice, the *designated examiner* evaluates whether the candidate's performance meets established *proficiency criteria* to earn credit toward the license, document, or endorsement. Further details on the qualifications of *designated examiner* can be found in NVIC 6-97.

Duty. An ongoing responsibility within a job that usually requires the performance of multiple tasks (e.g., *Officer in Charge of the Engineering Watch, Lookout, and Helmsman*).

Evaluation Criteria. The *evaluation criteria* comprise the general *standards of competence*. In practice, the *evaluation criteria* are further defined on the basis of *performance measures*, *performance standards*, and *proficiency criteria*.

Job. An employment post consisting of a cluster of related work responsibilities and duties (e.g., *Chief Engineer, Third Mate, Able-bodied Seaman*). In the STCW Code, a job is further defined on the basis of licensure level (e.g., Officer in charge of a navigational watch on ships of 500 gross tonnage or more).

Knowledge. The learned concepts, cues, facts, rules, and procedures that are necessary for proficient performance of a task (e.g., *knowledge of algebra, knowledge of the Navigation Rules, knowledge of procedures for starting the main engine*).

Objective Measure. A measure that relies primarily upon measurement apparatus that can be calibrated to yield highly consistent and accurate measurement results.

Performance Measure. The procedures used for observing and recording mariner actions, or the outcome of those actions. *Performance measures* record either the process of performance or the product of performance.

Performance Standard. The standard established for individual *performance measures*. *Performance measures* and *performance standards* are combined on the basis of *scoring procedures* to establish *proficiency criteria* for an assessment objective.

Proficiency. An individual's demonstrated ability to meet job performance requirements, as established on the basis of *performance measures*, *performance standards*, and *proficiency criteria*.

Proficiency Criteria. The scoring procedures and standards applied in determining the proficiency level of a candidate on the basis of *performance measures* and *performance standards*.

Qualified Instructor. According to the United States implementing regulations: "the person who has been trained or instructed in instructional techniques and is otherwise qualified to provide required training to candidates for licenses, documents, or endorsements." Further details on the qualifications of *qualified instructors* can be found in NVIC 6-97.

Reliability. The *consistency* of a measurement procedure. In the context of assessment, *reliability* can be generally defined as the consistency of the assessment outcome when applied under comparable conditions. Reliable assessments have well-defined assessment conditions, administration procedures, performance measures, performance standards, scoring procedures, and proficiency criteria. The reliability of an assessment establishes the maximum level of assessment *validity* possible. That is, an assessment can not be any more valid than it is reliable.

Scoring Procedures. The defined procedures for combining individual *performance measures* and *performance standards* that are conducted in the application of *proficiency criteria*.

Skills and Abilities. The behaviors that must be applied in successful performance (e.g., *typing skills*, *equipment fault-finding skills*, *navigation skills*, *shiphandling skills*). Measurable and observable skills are those of interest in proficiency assessment.

Subjective Measure. A measure that relies primarily upon an assessor's direct observation and interpretation of mariner performance to determine the assessment outcome.

Task. A single, observable work assignment that is independent of other actions and supports successful job performance. A task must be observable, be a complete work assignment, have a specific beginning and end, and be measurable by its intended product or outcome.

Validity. The extent to which a measure represents what was intended to be measured. In the context of assessment, *validity* can be defined as the degree to which successful completion of an assessment accurately predicts successful performance on the job. The maximum validity of an assessment is established on the basis of its *reliability*. That is, an assessment cannot be any more valid than it is reliable.

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