MARINE SURVEYOR CODE OF PRACTICE

Table of Contents

INTRODUCTION

Background

This document outlines the expected practices of marine surveyors undertaking marine surveying and claims assistance assignments, and applies to all employees and subcontractors of Lewis Martin & Associates Ltd. (Marine Surveys Canada).

The intent of this code of practice is to formalize the minimum expectations of marine surveyors employed with our firm, providing essential guidance that will help ensure a high degree of accuracy, consistent quality of work product, accountability, and the basis for ongoing development of the profession. This code of practice also serves to clarify for our clients and our peers exactly what can be expected from our organization when we are retained to conduct condition and valuation marine surveys and claims assistance assignments.

This code of practice is not intended to cover business operations and does not include proprietary information. Terms and conditions of employment, such as hours of work, time off, and confidentiality are contained within specific employment contracts. Details of administrative and operational requirements and procedures are contained in our Workplace Safety Plan.

It is our sincere hope as an organization that the content of this code of practice is of value to users both within and outside of our organization, in the interest of promoting and maintaining the principles of integrity and self-governance. This document is intended to be evolving, and we are committed to providing ongoing support for its development.

Definitions

For the purposes of this code of practice, the following definitions shall apply:

Accessible – A space or component that can be accessed, with or without the use of tools, and without damage or destruction of a portion of the vessel structure or interior cabinetry, and without disturbance or damage to single use gaskets, sealants, or adhesives.

Accreditation – A certification by a recognized marine surveying association that a marine surveyor has achieved a minimum level of knowledge and basic skills to function competently within the limitations set out by that association. Accreditation is not a guarantee of competency as a marine surveyor

Appeared - An opinion related to condition based on visual inspection and other non-invasive test methods. While the term *appeared* has been criticized as vague or non-committal, legal opinions often discourage absolute statements where access may be limited. When a report states “appears”, it is reflective of an opinion that relies on the surveyor’s knowledge and experience, as well as the accessibility of a component (or the internal condition of a component). As an example, a propulsion engine may appear intact and serviceable and the engine may perform well during sea trial, but the internal components of that engine cannot be readily inspected within the scope of a survey. Likewise, the entire span of hull framing is frequently not accessible for inspection but is presumed to be so if the accessible span presents as intact. In such cases, the term *appeared* is tied to the surveyor’s ability to access and is therefore not absolute. For the purpose of a report, the term *appeared* should be accompanied by a qualifying statement of why component condition cannot be verified. The term *appeared* should not be routinely used. Condition descriptions are generally accepted as dependent on ready access *and* as a statement of condition on the day of inspection only.

Apprentice (often represented as an associate membership with a recognized marine surveying association) – A person actively engaged in obtaining the knowledge and skills necessary to become a marine surveyor

Cockpit Sole – Refers to the walking or standing surface and structure in an area surrounding or adjacent to a helm or control station fitted to the vessel, but not a helm space that is included in the vessel's main cabin or enclosed interior space. It may include a bridge deck, an express cockpit or open cockpit area.

Condition & Valuation Marine Survey (C&V) – A report detailing the condition and value of a particular vessel. The report contains, at a minimum, details about a vessel's specifications and capacities, ownership information, description and condition of a vessel's structure and attachments, description and condition of all onboard systems, identification of regulatory deficiencies, and a determination of a vessel's fair market value and replacement value. In Canada, C&Vs are typically divided into two main categories; *Insurance Surveys* and *Purchase Surveys*

Conflict of Interest – A situation where a marine surveyor has multiple interests (personal and professional, or multiple professional interests where some may be perceived as personal) and one of those interests is at conflict with another. For example, a marine surveyor who is commissioned to survey a vessel on which they have completed repair work. This scenario would put the surveyor in a conflict-of-interest situation because they are inspecting their own repair work. Conflict of interest is present whenever a marine surveyor may be tempted to (or perceived as) changing requirements of this code of practice in order to achieve a desired outcome (financial or otherwise).

Conforming - Complies with applicable vessel construction standards or applicable legislation (interchangeable with the term *Compliant*)

Construction Standards – Standards developed for boat builders and repairers, for the purpose of improving safety for boaters. Some may be regulatory, based on date of manufacture, type of vessel or conditions of use. Others may be voluntary but still considered by the marine industry as best practice.

Deficiency – A finding that is either:
a) non-conforming with regulations applicable to the vessel; or
b) descriptive of deterioration of a component or structure sufficient to warrant repair or replacement

Deterioration – A condition where the integrity of a span of the vessel's structure or of a component installed to the vessel has been compromised by wear and tear caused by one or more of the following; weather and environmental factors (including UV degradation), improper maintenance, standing bilge water, damage causing the disruption or failure of protective coatings or finishes, improper component installation (failure to use suitable sealants or adhesives, or failure to properly close out core materials), failed seals or gaskets, broken hardware, cracks caused by vibration and movement of the vessel.

Displaced – A reference to a condition when an irregularity in the finish or substrate contains an area where the edges are not flush, or where one or both sides are either heaved or depressed in relation to the surrounding span of undamaged material.

Dynamic State – The condition of a vessel and onboard systems with the vessel afloat and fully commissioned for service, permitting the vessel structure to be evaluated while underway (or afloat at dockside), and onboard systems to be evaluated for full operation (fully tested). Inspection in a dynamic state supports descriptors such as 'operational' and 'not tested'

Finding – An observation made by the surveyor related to vessel condition.

Insurance Survey – A condition & valuation marine survey for insurance underwriting

Intact/Serviceable – Undamaged, or in a condition that would lend itself to being considered suitable for intended use, based on visual and physical inspection findings. The term is not intended to describe operational status of components, and is most commonly used to describe condition during out-of-water inspections (Static State).

Irregularity – A crack, penetration, chip, blister, discolouration or other indication of wear, damage, or previous repair to a finish. May also refer to areas presenting with a rough finish, particularly areas of rough finish on an otherwise smooth surface. The term is generally not used in survey reports, as it is broad in its interpretation. It is used in this code of practice to represent a number of possible deficiencies when surveying

Marine Survey – See *Condition & Valuation Marine Survey*

Marine Surveyor – A professional actively engaged in conducting condition & valuation marine surveys as a career choice, having made a conscious decision to achieve and maintain accreditation as a member in good standing of a recognized marine surveying association

Non-Displaced – A reference to a condition when an irregularity in the finish or substrate contains an area where the edges are flush in relation to each other, or where there is no heaving or depression of either side of the irregularity. Non-displaced irregularities are often associated with non-structural damage or wear and tear

Non-Regulatory Deficiencies – Findings that are non-conforming with voluntary construction standards, and therefore corrective actions are not required by law

Not Tested - Component was not operated to determine proper function

Operational – A component has been tested for proper operation and appears to be working properly at the time of inspection

Penetration – Any disruption, hole or perforation of a span of hull, deck, superstructure or reinforcing framing of a structure, whether for the installation of a through-hull fitting, vent, exhaust discharge, shaft, strut, outdrive, trim tab, electronic transducer, lifting eye, mooring cleat, railing stanchion, windshield, radar arch/tower/hardtop, canvas hardware or other installed accessory

Phenolic Hammer – A tool, preferably fitted with a non-marking plastic head or heads but in some cases may be brass or steel, used to strike a structural component of a vessel for the purpose of generating sounds that help determine the integrity of the affected area

Platform – Any structure extending beyond the dimensions of the main deck, whether integral to the hull and deck or as a bolt-on accessory (eg. bow pulpit or aft swim deck)

Purchase Survey – A condition & valuation marine survey conducted for purchase interest

Readily Accessible – A component or space that can be accessed for inspection without the use of tools

Ready Access - Access for inspection without the use of tools. In some cases, an absence of ready access would require disassembly beyond the scope of a survey inspection

Recognized Marine Surveying Association – One of three currently active professional bodies recognized by insurers in Canada, actively engaged in the association and accreditation of marine surveyors, along

with the development of rules and guidelines for ethics, conduct and accountability of its members. The three currently recognized marine surveying associations are known as follows;

- The International Institute of Marine Surveying (IIMS)
- The Society of Accredited Marine Surveyors (SAMS)
- The National Association of Marine Surveyors (NAMS)

Regulation – A document that forms part of an Act or law, usually identifying specific requirements related to boating safety. Example: Small Vessel Regulations are part of the Canada Shipping Act (2001)

Regulatory – Required by law

Regulatory Deficiencies – Findings requiring corrective action to bring the vessel into conformance with Canadian law

Relative Moisture Readings – Non-destructive electronic moisture test results using a surface pad type sensor. Readings of this type are relative and should not be expressed as a percentage. Relative moisture values require interpretation by the marine surveyor and should not be published in a report unless accompanied by a clear explanation of what the values mean. *(Note: Invasive moisture measurements using probes can provide more accurate readings which would be expressed as a percentage of moisture content, but they are not employed as apart of a marine survey)*

Shall – For the purpose of this code of practice, the word *shall* is to be taken to mean *must* or *will*

Should – For the purpose of this code of practice, the word *should* is to be taken to mean strongly recommended as a best practice, though not required

Soundings – Percussive tests conducted by striking a structural component of the vessel with a phenolic hammer that provide audible indicators as to the integrity of a substrate (eg. hull laminate or hull plating). Soundings are categorized as 'bright', 'dull' or 'slightly dull', or 'hollow'. Bright sounds refer to a sharp, or bright sound that typically indicates the substrate is hard or intact, similar to the sound of a hard object striking another hard object. Dull sounds refer to a muffled sound (akin to striking a softer object) that may indicate deterioration of the substrate. Slightly dull sounds refer to slight changes in the tone of soundings that may be an indication of early signs of deterioration. Hollow sounds refer to a thin or 'tinny' sound that may also be an indication of deterioration or problems with welds/bonding of materials, or voids beneath cosmetic finishes.

Superstructure – Structures above the deck including cabin trunks, cockpit coamings, bridge decks, bulwarks, hardtops, radar arches, towers, masts, aprons, pilot houses and wheelhouses

Suspect Soundings – Any soundings identified as abnormal, including dull or hollow

Static State – The condition of a vessel and onboard systems with the vessel hauled and/or with onboard systems decommissioned. Inspection of a vessel in her static state refers to evaluating condition without testing components for proper operation. Inspection in a static state supports descriptors such as 'intact', 'serviceable', 'conforming', 'compliant', or 'no ready access'

Structural Implications – Any deficiency identified in a span of the vessel's structure (hull, deck, superstructure, platform, or related reinforcing framing) where at least one of the following conditions exist:

- A hole, gap or displaced crack of any size resulting in the possibility of water penetration (or down flooding) at any point below the sheer
- A hole, gap or displaced crack of a span greater than 15cm (6”) measured on any axis, and located above the sheer
- Deterioration (or suspected deterioration) of part of a span that may adversely affect the ability of the material to maintain its shape
- Deterioration (or suspected deterioration) of part of a span that may adversely affect the ability of the material support its own weight, or the weight of components fastened to the affected span
- Deterioration (or suspected deterioration) of part of a span that may adversely affect the ability of the material to support the expected loads applied to the material (eg. dynamic anchor loads on a bow pulpit or dynamic loads of a dinghy on a swim platform)
- Deterioration (or suspected deterioration) of a full span in a specific area that may adversely affect the ability of the material to maintain its shape (eg. the full span of a side deck, even if the surrounding structures remain intact, or the full span of a single stringer within the engine space)
- Deterioration (or suspected deterioration) of any size part of a span at any point below the waterline, or above but within 30cm (12”) of the waterline
- Deterioration (or suspected deterioration) of a span greater than 15cm (6”) measured on any axis, between the sheer and the waterline

Substrate – For the purpose of this code of practice, a substrate refers to the primary construction material of a given span. It is used to differentiate the primary construction material from coatings or finishes applied to the primary construction material. As an example, with a fibreglass hull, the substrate is the composite laminate (a combination of resin, cloth and any core material used in construction) but does not include the gelcoat finish

Surveyor – For the purposes of this code of practice, the term *Surveyor* is synonymous with the term *Marine Surveyor*

Voluntary – Not required by law but most often considered by the marine industry as best practice

PART 1: PROFESSIONAL QUALIFICATIONS

1.1 Overview

Marine surveyors are required to maintain professional qualifications to support their work, through accreditation and continuing education. Those employed with Marine Surveys Canada shall maintain accreditation in one of the recognized marine surveying associations (IIMS, SAMS, NAMS) and abide by the continuing professional development requirements of each association to which they belong.

Marine Surveys Canada recognizes and endorses accreditation in a recognized marine surveying association as a minimum acceptable requirement for a marine surveyor working independently in the field. Those apprenticing as marine surveyors without accreditation shall work under the supervision of an accredited marine surveyor.

1.2 Accreditation

Accreditation is considered a minimum credential to work independently as a marine surveyor. Those working towards accreditation shall be developed within our firm to prepare for accreditation, working under the supervision of an accredited marine surveyor and subject to internal peer review for all reports.

Associate (or apprentice type) memberships in recognized marine surveying associations are not considered by Marine Surveys Canada to be a legitimate marine surveying qualification, as these memberships are afforded little in the way of oversight and accountability by the associations. Apprentice marine surveyors require ongoing and consistent guidance and shall have their performance measured against this code of practice when receiving peer review feedback. Apprentices shall not be permitted to physically inspect vessels independently until such time as they can demonstrate proficiency in executing the core competencies identified in this code of practice.

1.3 Education

Marine Surveys Canada acknowledges that there is currently no training available in Canada that supports this Code of Practice. As such, Marine Surveys Canada takes very seriously our responsibility to train and inform apprentice surveyors to meet the requirements of this code of practice. Those apprentice marine surveyors who develop skills in marine surveying through our mentorship and guidance will be adequately prepared for accreditation with a recognized marine surveying association.

Continuing education (or continuing professional development) requirements of the recognized marine surveying associations (IIMS, SAMS, NAMS) are considered by Marine Surveys Canada to be sufficient to encourage and maintain engagement with marine surveying peers and some of the current trends in the marine industry. It is expected that our marine surveyors will make themselves available for conferences and regional meetings as they become available. While the conferences provide some interesting education topics, marine surveyors should be aware of the limitations of such conferences and should actively seek training opportunities to improve their basic knowledge and understanding of construction standards and regulations. Marine surveyors should also seek opportunities to grow their knowledge and skillsets in vessel construction methods, inspection, critical thinking, failure analysis, interpretation of findings, valuation methods, and reporting.

PART 2: ETHICS

2.1 Overview

All marine surveyors shall hold themselves to a standard at least equivalent to the most stringent ethics requirements expected by the three recognized marine surveying associations (IIMS, SAMS, NAMS). Our marine surveyors are also required to adhere to the guidelines contained in this part of this code of practice.

2.2 Conflict of Interest

It is recognized that marine surveyors come from many different backgrounds, often deciding to try their hand at marine surveying while still primarily engaged in other pursuits within the marine industry. Surveyors often built relationships of trust with their clients and may be asked to perform additional services. Any situation where a surveyor engages in an activity that could unseat the perception of impartiality in the execution of the assignment is considered a conflict of interest. Examples of conflict-of-interest situations that should be avoided include, but are not necessarily limited to, the following:

- Any situation where a surveyor stands to benefit from performing additional work to correct deficiencies identified in a survey report generated by our firm
- Accepting an offer of additional remuneration to report a desired outcome
- Engaging in marine related services outside of the marine surveyor's employment with our firm, including advertising or offering up of services during or outside of work hours
- Yielding to pressure or threats by parties who may have an interest in the outcome of the survey report, including vessel owners, friends or family members of vessel owners, prospective purchasers, yacht brokers or boat salespeople, insurers, or repairers
- Under-reporting or over-reporting deficiencies
- Agreeing to resale or distribution of a report to any party other than the client with whom the firm has a confirmed agreement to provide services
- Verbal discussion of findings with a third party (such as a yacht broker or current vessel owner in the case of a purchase survey)
- Making any statements to a third party that may influence a client's ability to negotiate a contract of bargain and sale
- Admission of fault or taking responsibility for an error or omission that may impact our eligibility to make a claim through our professional liability insurance policy

2.3 Conduct and Competency

Marine surveyors shall adhere to the guidelines published by the recognized marine surveying association to which they belong (IIMS, SAMS, NAMS). Marine surveyors should be mindful at all times that they are representing not only the firm they work with, but also the marine surveying profession as a whole. Marine surveyors shall keep all communications professional and at arms length from any personal interest or involvement. Email or telephone communication is preferred in order to maintain a professional appearance. Marine surveyors shall ensure maintenance of clean clothing, footwear and outer wear. Clothing should be labeled or branded to identify the surveyor while onsite. Personal protective equipment shall be maintained in clean and serviceable condition. Vehicles shall be kept clean and tidy, and free from garbage.

Marine surveyors shall maintain a positive and professional demeanour, demonstrate respect for others and choose language befitting an educated professional. Use of foul language, abusive behaviour,

condescending behaviour, or any other speech or conduct that may negatively affect the marine surveyor's or the firm's reputation or credibility is not permitted.

Marine surveyors shall be respectful of other marine surveyors at all times. No opinions are to be expressed as to the competence or ability of any other marine surveyor, whether inside or outside the organization. Concerns respecting the competence of other marine surveyors should be brought to your supervisor or director immediately, particularly in cases that may result in injury to persons or damage to property or the environment.

2.4 Scope of Work

No surveyor shall undertake a condition and valuation survey unless the scope of work has been confirmed with the client. The scope of work shall include an outline of what items are to be inspected and what the client should expect to see in the survey report, and shall include any limitations or restrictions on the surveyor and the inspection process. The agreed scope of work shall include a reference to this code of practice.

PART 3: HEALTH & SAFETY

3.1 Overview

All marine surveyors employed with Marine Surveys Canada are required to be trained in our health and safety program, consisting of the following policies and programs that have been developed to comply with all Canadian jurisdictions. All marine surveyors shall adhere to these policies and programs.

3.2 Workplace Safety Plan

The Workplace Safety Plan is the overarching program that includes all health & safety components, along with administrative, operating and emergency procedures. The Workplace Safety Plan guides all operations within the organization, with a focus on a safe work culture regardless of the work assignment or environment. The Workplace Safety Plan shall be consulted as a guide for work practices in all situations. As part of the Workplace Safety Plan, hazard assessments are done as needed and reviewed for relevance at least annually. The Workplace Safety Plan also outlines any outsourced safety training requirements for marine surveyors (such as working at heights, confined space entry, and working around water).

3.3 Health & Safety Policy

The Health & Safety Policy is a statement of commitment from Lewis Martin & Associates Ltd. (Marine Surveys Canada) regarding the establishment and maintenance of a safe workplace for all employees and subcontractors.

3.4 Workplace Harassment Policy and Program

The Workplace Harassment Policy is a statement of commitment to a workplace free from harassment in any form. The Workplace Harassment Program addresses prevention and accountability for situations of workplace harassment.

3.5 Workplace Violence Policy and Program

The Workplace Violence Policy is a statement of commitment to a workplace free from violence (or the threat of violence) in any form. The Workplace Violence Program addresses prevention and accountability for situations of workplace violence.

PART 4: PRINCIPLES OF SURVEYING

4.1 Overview

This part covers the basic principles applied to marine surveying of pleasure craft of all types and construction materials. All testing undertaken during a survey inspection shall be non-destructive in nature. Opening areas for inspection that are ordinarily hidden from view shall only be undertaken where fasteners can be easily removed without extensive disassembly of the vessel's cabinetry or disruption of permanently-installed sealants or adhesives. Generally speaking, a maximum of twelve (12) fasteners is the guide we use for accessibility.

The marine surveyor should keep in mind that it is not the responsibility of the surveyor to determine whether or not a vessel is of sound design. If the vessel is a production model, or if it has been registered or licensed for pleasure craft use in Canada, it has been vetted by Transport Canada in terms of safety regulations related to its design and construction. When commissioned to survey a vessel, the marine surveyor's responsibility is to identify deficiencies including deterioration and failures. Identification of deterioration and impending failures can often be significant indicators of the limitations of a given design, as well as failures in choice of construction materials, methods of construction, and quality control processes during manufacture. Marine surveyors shall avoid commentary in their reports that could be considered an opinion about the soundness of the design, or the quality of work of the designer or manufacturer. Where requested to provide insight, comments can be made by the marine surveyor as to recommended best practices with respect to repair of sub-standard design or construction that has resulted in premature deterioration or failures, but the comments should be constrained to the approach to repair rather than any shortcomings of the original design or construction.

4.1.1 Visual Inspection Requirement for All Vessel Types

For the purpose of this code of practice, all parts of a vessel shall be inspected visually for irregularities, and it is to be presumed that visual inspection is to be conducted on all accessible surfaces of the vessel structure and onboard systems. Irregularities sighted during inspection of the vessel shall be reported. The report shall include a description of any irregularities found on visual inspection, along with any structural implications and any potential issues with proper and safe operation of the vessel and her onboard systems.

4.1.2 Off-Season Covers

Shrinkwrap and off-season covers shall be removed prior to surveying. If the cover has not been removed prior to the marine surveyor's arrival, inspection work shall not commence until the cover has been removed. In some cases, this may require rescheduling. The marine surveyor shall not remove shrinkwrap or winter covers. Mooring or trailering covers may be removed by the surveyor and should be replaced when the survey inspection has been completed. The vessel should be left in the same condition as it was found, within reason. Marine surveyors are not expected to remember complex lashings with multiple covers. In such cases, the marine surveyor shall communicate with the client or vessel owner specifically as to how the vessel was left, in case the client wishes to return and arrange the covers to their preference.

4.2 Inspection vs. Reporting

One of the challenges of accurately and efficiently surveying a vessel is that we inspect differently than we report. When inspecting a vessel, marine surveyors move from one area of a vessel to another, inspecting all components in a given space before moving on. In contrast, we report by system. This means that inspection findings need to be categorized to system when being translated into a report. The marine surveying profession has access to a number of different methods of doing this. At Marine Surveys Canada, we have found that the most efficient way of collecting and categorizing information accurately is to have the marine surveyor use a checklist (either in paper form or PDF on an electronic tablet). The report is matched to this checklist in a way that permits easy transfer of the information directly into the report template.

4.3 Purchase Surveys

Surveys commissioned for purchase interest shall include, whenever possible, an out-of-water inspection, an inspection with the vessel afloat at dockside with all systems fully commissioned for testing, and a sea trial (also referred to as a limited test run) inspection. Out-of-water inspections typically focus on condition of the vessel structure and onboard systems in their static state (see Definitions section of this code of practice), whereas the inspections conducted with the vessel afloat at dockside or on sea trial provide the opportunity to see the vessel in a dynamic state. A marine surveyor shall test all components dynamically on purchase surveys where power is available and systems have been fully commissioned.

As most purchase surveys are commissioned by a prospective purchaser, any deficiency or combination of deficiencies that are related to structural deterioration or another high-cost finding shall be immediately brought to the attention of the client. The client may direct the marine surveyor to discontinue the survey inspection if the vessel condition is deemed unsuitable to complete the agreement of bargain and sale. A decision to stop work must be made by the client and not by the marine surveyor. In the absence of the client being able to make an informed decision, whether because they are unavailable for consultation or because they are unsure of their decision, the survey shall proceed as scheduled.

4.3.1 Out-of-Water Inspections

For purchase surveys with a vessel hauled, the marine surveyor shall make every reasonable effort to complete inspection of the vessel structure first. In cases where the vessel is hauled temporarily for the surveyor to inspect, the focus should be on the hull, platforms, and equipment fitted below the waterline prior to moving onto decks, superstructure, and interior portions of the hull and hull framing. Completing the inspection of surfaces and structures below the waterline allows the vessel to be launched sooner, in cases where the marina may be waiting for the marine surveyor to finish, and also helps identify any major repairs prior to making a decision to launch the vessel. Purchasers and current owners alike will appreciate the ability to move on from the purchase decision should deficiencies arise that the purchaser considers unacceptable to complete the bargain and sale agreement. Once the hull and underwater gear have been inspected, the marine surveyor shall notify the persons responsible for launching the vessel. If there is a delay in launch, or if the vessel is to remain hauled following the survey, the marine surveyor can proceed with inspection of the hull interior/framing, decks and superstructure.

4.3.2 Inspecting the Vessel Afloat

Marine surveyors are often asked to begin a purchase survey inspection with the vessel afloat. In such cases, efforts should still be made to inspect the structure first. Decks, superstructure, top surfaces of

platforms, and structural framing can and should be accessed with the vessel afloat. Once structural inspection has been completed, the marine surveyor shall continue to inspect the vessel at dockside, including all onboard systems. Providing a system is fully commissioned, it should be evaluated in a dynamic state for proper operation. Any exceptions shall be noted in the report.

4.3.3 Sea Trial Inspections

A sea trial shall not be conducted until the vessel has been fully surveyed. If a vessel is first seen afloat as part of a purchase survey, the vessel shall be fully surveyed afloat prior to departing for the sea trial. It is acceptable to haul the vessel and conduct the out-of-water inspection after the sea trial. The sea trial shall include inspection of accessible spans of the vessel structure while underway, evaluation of onboard systems in their dynamic state, including propulsion and power generation systems. A sea trial may be conducted prior to inspecting the vessel afloat, as long as the marine surveyor has completed a full out-of-water inspection prior to launch and departure for sea trial.

4.4 Insurance Surveys

Surveys commissioned for insurance underwriting purposes shall include, at a minimum, an out-of-water inspection that includes an evaluation of vessel condition with the vessel in a static state. It is acknowledged that insurers do not typically require a sea trial to be conducted as part of a C&V marine survey for insurance underwriting.

4.4.1 Component Testing

In cases where an insurance survey is commissioned with the vessel afloat (either as an interim inspection pending haul out at a later date, or as an insurer-acknowledged exception), power may be available to test commissioned systems onboard, however, dynamic testing of all onboard systems is not a requirement for an insurance survey. Where no power is available, it shall be duly noted in the report. It should be noted that onboard systems are not routinely tested during out-of-water inspections, as most systems cannot be properly evaluated for full operation unless the vessel is afloat and fully recommissioned. It is always the responsibility of the vessel owner/operator to ensure all systems are operational prior to each voyage.

4.4.2 Inspection Method & Reporting

In contrast to purchase survey inspections that may be aborted at the direction of the client, all insurance survey inspections shall be fully completed, and a full report shall be issued. Discontinuation of a survey inspection for an insurance survey will lead to incomplete information on vessel condition being communicated to the vessel owner. Insurance surveys shall be completed in the most efficient manner possible, meaning structural components can be inspected alongside onboard systems in order to reduce repeated inspections in the same space. Weather may play a part in determining whether the marine surveyor should decide to tackle hull bottom or interior spaces first.

4.5 Client Communication

Client communication is a significant responsibility for the marine surveyor. A failure to communicate with a client, or internally within the firm, can impact the perception of professionalism and competence of the marine surveyor. All communications shall be timely. Messages received, whether by phone, text or email, shall be responded to within one (1) business day.

4.5.1 Prior to Scheduled Inspection

Clients are to be contacted by the surveyor in advance of scheduled work assignments, both as an introduction and to confirm the scope of work, vessel and access details. Initial contact shall be made prior to the scheduled day of service, preferably one day to one week in advance.

4.5.2 Following Inspection

Clients should again be contacted no more than 24 hours following the completion of an inspection. Clients shall be advised of any major deficiencies that may impact insurability of the vessel, along with any findings that may impact the disposition of the bargain and sale contract. Such communication shall be brief, and the marine surveyor must make clear that the survey report will contain other findings not discussed verbally. Clients shall be encouraged to wait for the issuance of the marine survey report before making any decisions related to purchase and repair.

4.6 Survey Reports

Survey reports shall be issued following completion of a vessel inspection. A survey report should contain, at a minimum, all criteria identified in the Minimum Survey Report Content document published by SAMS. In addition, the following principles shall be followed when developing and publishing reports.

4.6.1 Format and Language

Reports may be arranged in any format and can include a combination of text, point form and tables to present information. Reports shall be easy to read, avoid duplication of statements, and shall contain clear, concise and plain language.

Reports shall also include a sufficient number of pictures to demonstrate the layout (a minimum of four pictures to show sides, bow, stern, plus several deck and interior views) and onboard systems fitted, along with any important safety and regulatory findings (or any findings that may be difficult to clearly describe in text).

Marine surveyors should bear in mind that the reader of a pleasure craft survey report is often a recreational boater or an insurer. In many cases, the reader does not have an extensive knowledge of nautical terms. While nautical terms need to be used to identify some components and spaces on a vessel, plain language shall be used to communicate important action items, including the nature of deficiencies and the urgency of any necessary repairs.

4.6.2 Client Right to a Report

Every marine survey client has a right to receive a condition & valuation marine survey report as a part of their contract with our firm. As such, marine surveyors must ensure all checklist and report functions are executed in a timely manner in order to facilitate generation of the survey report within the benchmark set in the section below.

4.6.3 Report Turnaround Benchmark

Completed survey reports shall be emailed to clients within five (5) business days of the completion of the inspection. In situations where the inspection takes place over multiple days, completion of inspection is considered to be the last day that the surveyor was onsite for inspection.

4.6.4 Peer Review

All completed survey reports shall be peer reviewed by an accredited marine surveyor prior to release to the client. Employees tasked with peer review functions shall evaluate the content of a marine survey report against this code of practice. Spelling, punctuation, grammar, and the presence of contradictory

statements shall also be addressed as part of the peer review process. The attending surveyor retains the final decision on any item brought up for discussion during peer review. Apprentices shall abide by the recommendations of the accredited marine surveyor conducting the peer review, providing such recommendations are in keeping with this code of practice.

4.6.5 Publication and Distribution

Reports shall be published to PDF format. File size shall be a maximum of 10GB. Reports shall be emailed to clients. Printed copies can be requested by clients. Marine surveyors are permitted to charge a document fee of up to CAD$75.00 to cover the cost of printing and shipping.

4.6.6 References

All values of vessel dimensions, capacities, nominal thickness measurements, and component specifications shall have a reference provided in the report as where the value came from (manufacturer, subscription service, approximate measurements, or estimated).

4.6.7 Access for Inspection

Each part, space or component of the vessel is presumed to be fully accessible for inspection unless otherwise stated in the report. Limited access shall therefore be stated clearly in the report, including the reason that the surveyor could not access the component for inspection. *Exception:* Areas of vessel structure and installed systems normally fully enclosed and not accessible without extensive disassembly or destruction of a portion of the vessel structure or interior cabinetry are considered inaccessible by design and a comment from the surveyor is not expected in the report.

4.6.8 Description, Condition and Deficiencies

Every part of the vessel structure and every onboard system shall be described in the report. A basic description of the components of each system, how the system is configured, and the condition of components in each system shall be included in the report. At a minimum, the condition of structures, spaces and onboard systems shall be described as follows:

- Intact/Serviceable (may include basic operation of a mechanical component)
- Operational (if a power-operated component has been powered up and tested)
- Not Tested (if component has not been powered or had basic operation tested as part of the survey)
- Conforming (if component conforms to an applicable standard or regulation)
- No Ready Access (no reasonable access for inspection on the day of survey, and therefore no comment can be made on condition)

Deficiencies identified in each part or system of the vessel shall also be noted in the report.

4.6.9 Vessel and Component Specifications

Each report shall contain, at a minimum, the following vessel and component information. Information shall be expressed in both metric and imperial measures, with metric listed as the primary value and imperial listed in brackets:

- For whom the report has been prepared (client)
- Name of Vessel
- Name of Vessel Owner
- Make/manufacturer
- Model
- Model Year

- Year of Manufacture
- Hull Identification Number (HIN)
- Presence of Canadian Compliance Placard
- Presence of Capacity Label
- Pleasure Craft License number (non-registered vessels)
- Official Number (registered vessels)
- Principal dimensions (LOA, beam, draft, displacement, ballast, sail area, pax/load capacity)
- Principal capacities (propulsion fuel, water, holding)
- Tonnage and Port of Registry (for registered vessels)
- List of required vessel documents present (PCL, CofR)

4.7 Relative Moisture Readings

Electronic moisture meters are used to help establish relative moisture content in various structures, including fibreglass (FRP) and wood hulls, decks, superstructures, hull and deck reinforcements, bulkheads, interior cabinetry in accommodation spaces, and even vinyl, fabric and foam headliners in cabin interiors. Excepting metallic or carbon fibre structures, and conductive bottom paint, meters can be used to establish, in broad terms, whether a structure is dry or contains moisture. Use of a moisture meter on interior finishes can help identify areas of moisture ingress to the cabin via various hull or deck penetrations. All moisture readings taken using non-destructive methods (typically a sensor pad on the meter that reads at a specified depth inside the substrate) are *relative*, meaning relative to a known dry substrate. Relative readings are not expressed as a percentage and are often non-linear, meaning double the number does not translate to double the moisture content. Differences in sensitivity and scale between meter brands and models results in a wide variety of numbers being published. There are many different moisture meters that can work for surveying. Surveyors must be familiar with how to interpret the readings obtain on their particular meter.

4.7.1 Interpretation of Relative Moisture Readings

Moisture meters are only an adjunct for inspecting vessel condition. High relative readings do not, of themselves, indicate a structural failure or deterioration. Relative moisture readings are taken to show if elevated moisture is detected in a substrate, and whether the elevated moisture detected is slight, moderate or significant. Core samples taken from laminates are often found to be surprisingly dry when inspected visually and by touch. Slightly elevated readings of a core sample may be dry to the touch. Moderately elevated readings may present as damp to the touch but without visible moisture, and significantly elevated readings on a core sample are likely to appear wet and may drip. The specific number on the meter is far less important than the range where the reading is found. It is the interpretation of the meter readings by the marine surveyor that is important. Values shall not be published in a report without accompanying interpretation. While this code of practice does not address which meters are most suitable for use, we have used the Flir models MR160 and MR176 as a reference example, as they are the most commonly used meters in our firm. See Table 4-1: Flir MR160/MR176 Moisture Meter Values Interpretation in Appendix A: Reference Tables at the end of this code of practice.

4.7.2 Meter Maintenance and Calibration

Electronic moisture meters typically require little in the way of maintenance. They should be kept dry (as many are not waterproof or water resistant) and clean, and stored in a protective case when not in use. Some models require periodic calibration. Marine surveyors shall adhere to the recommendations of the meter manufacturer and should maintain calibration and repair records for a period of five years, in case evidence is required to show due diligence.

4.7.3 Off-Season Surveying of Fibreglass & Wood Structures

Vessels with fibreglass (FRP) or wood structures must be surveyed in temperatures above freezing, as moisture meters will show substrates as dry if the material is frozen, rendering the moisture meter useless as meter readings will be inaccurate. When surveying these structures during the winter or fringe seasons, care shall be taken to ensure that the vessel is fully thawed. Consideration shall be given to overnight low temperatures leading up to the scheduled inspection, and temperatures of hulls and hull framing shall be measured on arrival using infrared or thermal imaging devices. Temperature readings shall be recorded in the survey report. A survey inspection shall not proceed if the hull or hull framing temperatures are recorded below +3C, as there is increased probability that an insurer will not accept the report.

4.8 Deficiencies

Many deficiencies can be identified as non-conforming with regulations and construction standards. Marine surveyors shall, wherever possible, cite the regulations and construction standards when discussing or reporting deficiencies. Violations of these regulations amount to contravention of Canadian law and are considered regulatory in nature. Parts of the regulations apply based on date of manufacture or may be dependent on conditions of use, vessel size or tonnage, while others are absolute. Construction standards, while not laws unto themselves, can be enforced by regulations, often based on a vessel's date of manufacture. Marine surveyors are responsible to accurately represent deficiencies and cite regulatory/standards references as a part of their responsibility to communicate accurate information. Making false claims that all construction standards are compulsory is not only inaccurate, but it places an unnecessary burden on vessel owners to comply with standards not required for the age of vessel, serves to confuse insurance underwriters, and discredits the profession of marine surveying in general.

Non-regulatory deficiencies often represent best practices within the marine industry. Non-regulatory deficiencies include non-conformities with Canadian and foreign voluntary construction standards, such as ABYC and NFPA Standards. Marine surveyors should be familiar with these voluntary standards, as they may represent the most recent opinions from the marine industry on best practices for vessel safety. Marine surveyors must be aware, however, that some foreign standards have been made regulatory, either by direct reference in a Canadian regulation, or by indirect reference in a Canadian construction standard. It is the responsibility of the marine surveyor to be acutely familiar with the difference between those deficiencies which are regulatory and those which are non-regulatory (voluntary or best practice). More information is provided in our Pleasure Craft Regulations and Standards Matrix and Commercial Regulations and Standards Matrix documents.

PART 5: VESSEL STRUCTURE

5.1 Hull, Decks, Superstructure, Platforms

This part covers inspection and reporting functions related to the hull and deck materials, hull & deck reinforcements (framing), transom, bulkheads (including water tight bulkheads), topsides, superstructure, interior structures & finishes, bilges, deck hardware and fittings, arches/hardtops/support structures affixed to the decks. All structures shall be inspected visually, with sufficient natural or artificial light to permit identification of surface irregularities. All structures shall be sounded using a phenolic hammer. The purpose of undertaking detailed visual inspection and soundings is to establish the integrity of the structure. The structure should be considered intact if it appears visually intact and if soundings confirm the visual presentation. Structural Condition Categories have been

identified in this code of practice, to help the marine surveyor in consistently reporting findings and their urgency of repair. Structural Condition Categories are intended to provide a framework for reporting standards. Terminology used to describe findings in survey reports shall be consistent with the descriptions in each subsection of structure type within this part of the code of practice. See Table 5-1: Structural Condition Categories in Appendix A: Reference Tables at the end of this code of practice.

5.1.1 Bottom Inspection Safety Considerations

The hull and underwater gear shall, wherever possible, be inspected while the marine surveyor has access with the vessel hauled. Blocking and stands, trailer wheel chocks, cradles and other supporting structures shall be checked and confirmed secure prior to the marine surveyor climbing underneath the vessel. Keel blocks shall be used to support the weight of any vessel surveyed in the slings of a travel lift or covered slip. Bottom inspections shall not be conducted in covered slips where Safe Working Loads or engineering certificates have not been provided to ensure safety. Bottom inspections shall not be conducted with the marine surveyor standing on ice below a covered slip. Arrangements will need to be made to have the vessel safely hauled and secured on land. It is the responsibility of the vessel owner to bear any costs related to haul and launch.

5.1.2 Hull/Bottom Inspection

5.1.2.1 Visual Inspection

The inspection of the exterior of hull bottoms, transoms, topsides structures and the underside of platforms can be impacted by several factors. Poor lighting conditions shall be addressed prior to commencement of inspection. Visible disturbances shall be reported as either displaced or non-displaced. Displaced findings shall be further investigated as much as the area is accessible, from both the hull exterior and interior, and any displaced irregularities with structural implications shall be described in detail in the report.

5.1.2.2 Hull Soundings

Soundings shall be conducted based on a grid pattern, with approximate measurement of spacing in accordance with the matrix contained in Table 5-2: Hull Soundings Matrix in Appendix A: Reference Tables at the end of this code of practice.

5.1.2.3 Hull Material

The surveyor shall inspect the hull material to determine the type and condition of the substrate, and shall include a description in the report of the hull material and any known core material. In cases of metal hulled vessels, nominal thickness shall be reported if available. Report descriptions of condition shall include whether the hull presents as intact and fair.

5.1.2.4 Transom

The transom shall be inspected and a description provided in the report for type, presence and type of core material, construction material, along with its integrity and condition.

5.1.2.5 Hull Finish

The surveyor shall inspect the hull finish to determine the type and condition of the coating or finish, and shall provide a description in the report of the type of hull finish coating (whether paint, gelcoat, or otherwise) and whether or not the vessel has an antifouling bottom paint applied. A disclaimer statement shall be included in the report if anti-fouling bottom paint is present, outlining the fact that the presence of bottom paint can obscure visual inspection.

5.1.2.6 Fastenings

The surveyor shall inspect the fastenings of hull materials and the fastenings of hull reinforcing or framing material to determine the type and condition of the fastenings. Fastenings may be screws, bolts, rivets, welds, bonds, laminations at joints, treenails, or bungs. The surveyor shall provide a description of the condition and integrity of fastenings in the survey report. In cases of metal structures, the location of different weld types (stitch welds vs. continuous welds) can be reported but such detail is not a requirement of this code of practice. The same applies to measurements of tabbing overlap in composite structures.

5.1.4 Hull & Deck Framing Inspection

5.1.4.1 Soundings

Hull and deck frames below deck level, including stringers, cross-frames, transverse frames, ring frames, soles of storage lockers, deck beams and deck heads, knees, keels and keelsons, and bulkheads shall be sounded wherever they can be accessed. See Table 5-3: Hull and Deck Framing Soundings Matrix in Appendix A: Reference Tables at the end of this code of practice.

5.1.4.2 Hull Reinforcements

Framing, also referred to as hull reinforcements, shall be inspected to determine type and condition. A general description of the spans and orientation of framing shall be included in the survey report. For composite materials, descriptions should include whether the framing is solid, cored (including core type, if known), or hollow. A description of any bonded liners shall also be included in the survey report. For metal framing, the description in the report shall include the shape, type, orientation and location of various type of framing (eg. longitudinal steel I-beams and transverse angle frames). Measurements of framing dimensions are not required in the survey report, though it is advisable to retain pictures or notes of any measurements taken and not published.

5.1.4.3 Deck Reinforcements

Deck and superstructure framing is often not accessible (limitations of access shall be duly noted in the report, including why access was not afforded). A general description of the framing type and construction materials shall be included in the survey report, as well as a description of the location, integrity and overall condition of the framing structures.

5.1.4.4 Bulkheads

Structural bulkheads shall be inspected for type and condition. Report descriptions shall include construction materials, locations of bulkheads, and the integrity and overall condition of the bulkheads.

5.1.5 Decks & Superstructure Inspection

5.1.5.1 Soundings

Soundings shall be conducted based on a grid pattern, with approximate measurement of spacing in accordance with the matrix in Table 5-4: Decks and Superstructure Soundings Matrix in Appendix A: Reference Tables at the end of this code of practice.

5.1.5.2 Decks and Superstructure

Decks, cabin trunks, pilot houses, wheelhouse structures, hardtops, radar arches, and wake towers shall be inspected for type and condition. A description shall be provided in the survey report as to construction materials, as well as the integrity and overall condition of the structures and installations.

5.1.5.3 Deck Finishes

Coatings and finishes on decks and superstructures shall be inspected for type (where available) and condition. A description in the survey report of the finishes should include the type and condition. Unfinished surfaces shall also be described.

5.1.5.4 Non-Slip Finishes

Non-slip (sometimes referred to as non-skid) finishes shall be described as to their location and condition. Non-slip finishes may be comprised of moulded finishes in gelcoat in composite structures, sand or similar additives to paint coatings, adhesive tape, knurled plastic or rubber inlays, carpet or foam coverings, and raised patterns on metal structures (such as checkerplate or the ridges on rebar). Non-slip finishes should be expected on exposed weather decks, platforms, cockpit soles, stairs, ladders, or any area exposed to the elements or weather. Report descriptions shall include basic details of the presence of non-slip finishes in various parts of the vessel.

5.1.5.5 Cockpit & Cabin Soles

The soles of the cockpit and cabin areas shall be inspected for type and condition. Report descriptions shall include location and configuration, construction materials, finishes and coverings, integrity and overall condition.

5.1.5.6 Cabin Sole Framing

Any supportive framing for the cabin sole, other than framing that forms a part of the hull reinforcements, shall be inspected for type and condition. Report descriptions shall include construction materials, configuration and orientation of framing, and the integrity and overall condition of the framing.

5.1.5.7 Hull/Deck Joint and Rub/Toe Rails

The join of the hull and deck shall be inspected for type and condition. Care should be taken to access the hull/deck joint wherever possible, to assess for any failures of substrate or fastenings, and to identify and signs of water seepage. Report descriptions shall include the type of joint (eg. shoebox, inboard flange, outboard flange) and how it is fastened (eg. mechanically fastened, bonded), along with the integrity of the joint and its overall condition.

Rub rails or toe rails fitted to the perimeter of the hull/deck joint (or in a location of the topsides above the waterline and below the sheer) shall be inspected for type and condition. Report descriptions shall include locations, construction materials for the rub rail and any finishing inserts fitted, as well as overall condition.

5.1.5.8 Platforms

Aft platforms and bow pulpits shall be inspected for type and condition. Descriptions shall include the type, location of installation, construction materials, and whether the platforms are integral to the structure or bolted on. Report descriptions shall also include integrity of the structures and overall condition, and operational status of powered components if tested.

5.1.5.9 Bulwarks

Bulwarks shall be inspected for type and condition, and shall be measured for compliance with regulations and construction standards. Report description statements shall include locations of installation, construction materials, integrity and overall condition. Height measurements are not required in the report, however pictures and notes of any measurements should be retained for future reference.

5.2 Composite Hulls, Decks, and Superstructures

Composite materials refer to all variations of laminated plastics, including fibreglass and carbon fibre, and regardless of resin type. Some composites allow successful and accurate collection of electronic moisture detection data. In all cases where electronic moisture detection is used to determine the presence and extent of relative moisture in a laminate, an interpretation of the meter readings is required in the survey report. Different types or brands of meters show values differently (different sensitivities and different scales), therefore publication of meter values without definitions can be misleading to the reader. In addition, many moisture meters behave differently when exposed to surface moisture on a laminate. Meter accuracy is also affected by metals and conductive elements in carbon fibre composites and antifouling bottom paints. In cases where the marine surveyor identifies disruption in meter accuracy over certain spans that may contain conductive elements, a statement is require in the report that clearly communicates the affected areas and that meter readings should not be relied upon in the affected areas.

With composite structures (including FRP and carbon fibre laminates), determining the presence of structural implications of deterioration of a span of laminate or framing is based on the criteria outlined in Table 5-5: Establishing the Degree of Deterioration of Composite Structures in Appendix A: Reference Tables at the end of this code of practice.

5.2.1 Fibreglass (FRP) Structures

Laminates shall be inspected where accessible for adequate strength of construction, including the presence of sufficient fibreglass on reinforcement framing, sufficient laminate thickness, sufficient tabbing of reinforcement framing and bulkheads, whether the laminates are intact, and any irregularities or indications of deterioration, particularly deterioration with structural implications.

The limitations of non-destructive testing result in limited visualization of internal components of FRP laminates. This means that core materials are often hidden from view. Further investigations requiring invasive type testing are often indicated, however, permission needs to be obtained to undertake such work. In any case, invasive testing is not within the scope of a C&V marine survey.

In certain circumstances, deterioration may become visible as the laminate breaks down and opens up. Often, visible rot can be seen. Use of an awl or screwdriver to test the hardness and integrity of core material is an acceptable method of determining core condition, providing the core is exposed and accessible. Drilling or other destructive methods of accessing core materials is not appropriate as part of a marine survey. Photographs of deteriorated core material are helpful in demonstrating the degree of deterioration, particularly in hard-to-reach areas. Laminates surrounding open core should be carefully inspected for other indicators of deterioration, such as delamination of the FRP cloth layers or disbanding of tabbing from surrounding structures.

Soundings provide an excellent indicator of laminate integrity. Bright soundings in FRP laminates indicate the laminate is likely intact. Slightly dull sounds typically indicate early signs of core breakdown. More pronounced dull sounds typically indicate more progressed deterioration. Hollow sounds in small, isolated areas are often blisters or voids, either beneath the finish or between layers of FRP cloth. Most blisters and voids are not structural in nature, although large clusters of blisters and voids can be very expensive to repair. The industry sees a wide range of opinions from surveyors when it comes to reporting the extent (and implications) of deterioration in FRP laminates. This code of practice provides a framework for categorizing and reporting deterioration. Marine surveyors shall use the guidelines in this code of practice to assist in standardizing how such findings are reported.

5.2.2 Carbon Fibre Structures

Carbon fibre is similar to FRP in that is comprised of both cloth and resin, in simple terms. While carbon fibre is known to have greater strength than FRP structures, it is also known to be conductive, meaning the presence of carbon fibre in a laminate will cause inaccurate moisture meter readings. Meters will show very high readings in areas containing carbon fibre, much like metal structures or conductive bottom paints. Even in blended laminates where carbon fibre is only employed in structurally significant areas of the laminate, the meter readings will be disruptive and can masquerade as elevated moisture. The vessel manufacturer may be able to provide a laminate schedule or drawings indicating the location of carbon fibre reinforcement. Vessels constructed entirely of carbon fibre will render moisture meters useless for determining moisture content in the laminate. The survey report shall indicate if carbon fibre is believed or confirmed to be present in the laminate, and should include a cautionary statement about the impact of carbon fibre on relative moisture readings.

Carbon fibre is also very noble in terms of galvanic corrosion. Where less noble metals (like stainless steel) come in contact with carbon fibre laminates, the fasteners are likely to corrode at an accelerated rate. Care should be taken to inspect fastener integrity. Indications of crevice corrosion should be taken seriously, and fasteners may need to be removed periodically for inspection.

5.2.3 Kevlar Reinforcements

Kevlar is a strong fibre used in many industries to reinforce materials for specific applications. A handful of boat builders in North America have blended Kevlar into their FRP laminates to improve strength without increasing weight. Kevlar is not conductive and will not upset or fool moisture meters. Electronic moisture meters can and should be used on Kevlar reinforced structures.

5.3 Metal Hulls, Decks, and Superstructures

The fundamentals of inspection for metal hulled vessels remain largely the same as for other hull materials. Metal structures are highly conductive and will upset moisture meter readings. Electronic moisture meters shall not be used when surveying metal structures, but can be used on wood or FRP composites fitted to metal hulled vessels. Care should be taken where metallic structures lay beneath thin FRP or wood structures, as some electronic moisture meters will detect the metal through the thin wood or FRP span, and can create inaccurate and misleading relative moisture readings.

5.3.1 Visual Inspection, Ultrasonic Testing, and Sounding of Metal Structures

Plating, welds, and reinforcing framing shall be inspected where accessible for adequate strength of construction, including the presence of sufficient material thickness, sufficient welds of plating, reinforcement framing and bulkheads, whether the steel components are intact, and any irregularities or indications of deterioration, particularly deterioration with structural implications. Deterioration of protective coatings will give rise to accelerated corrosion.

Where possible, nominal plating thickness shall be recorded in the survey report as a baseline or reference. Manufacturers may be able to provide the limitations of non-destructive testing can result in limited visualization of plating thickness. Any area showing signs of deterioration, such as corrosion with visible material loss, or suspect soundings, should have an accompanying report recommendation to be further investigated with ultrasonic testing (UT) of plating thickness. UT of hull and deck plating is not included in the scope of a C&V marine survey and requires the permission of the vessel owner to proceed; however, UT can be employed to spot check specific areas of concern. Findings of any random spot checks with UT should be documented and compared to the reported nominal plating thickness. In any

case, the area may be prepped for UT by removal of corrosion, but removal of protective paint coatings will require permission from the vessel owner.

Soundings provide an excellent indicator of plating integrity. Bright soundings in metal structures indicate the plating is likely intact. Slightly dull sounds typically indicate areas near framing welds, whereas more pronounced dull sounds may be a warning of significant material loss and subsequent thinning of the plating. Hollow sounds in small, isolated areas are often related to coating failures, voids or blisters (either beneath the finish or between layers of corrosion), or weld failures. Often, weld failures occur in areas not readily accessible to the marine surveyor, and suspect soundings may be the only indication of a problem. The industry sees a wide range of opinions from surveyors when it comes to reporting the extent (and implications) of deterioration in metal structures. This code of practice provides a framework for categorizing and reporting deterioration. Marine surveyors shall use the guidelines in this code of practice to assist in standardizing how such findings are reported.

With metal structures (including steel and aluminum), determining the presence of structural implications of deterioration of a span of plating or framing is based on the criteria in Table 5-6: Establishing the Degree of Deterioration of Metal Structures in Appendix A: Reference Tables at the end of this code of practice.

5.3.2 Steel Structures

Depending on plating thickness, more force may be required for steel structures when performing percussive sounding tests. Regardless, only sufficient force shall be used to generate a sound loud enough to be useful in determining condition. Care shall be exercised to avoid marking or denting the plating.

Carbon steel is also known for being prone to corrosion, particularly mild surface corrosion. Areas not protected with a paint coating will quickly show surface corrosion, even in freshwater environs. Surface corrosion should be documented in the report, though without material loss this is not considered a significant finding. Areas with visible flaking of the steel substrate will suffer long term deterioration and thinning of steel plating or framing. Any areas showing significant flaking corrosion, pitting or cavities on the surface of the plating shall be flagged for further investigation and a recommendation for ultrasonic testing (UT).

5.3.3 Aluminum Structures

Aluminum vessels shall be approached in much the same way as steel. As aluminum is softer than steel, care shall be exercised to avoid marking or denting the plating.

Aluminum corrodes differently than steel. It is a more noble metal and is therefore more resistant to corrosion than steel, but aluminum will corrode in the right conditions. Aluminum should be carefully inspected visually for any signs of deep pitting. For the purpose of this code of practice, pitting on the surface of unfinished aluminum structures is considered deep if the pitting is palpable by hand. Pitting will most often occur in areas not accessible for inspection, because the aluminum requires oxygen in the air to develop and maintain its protective barrier. Aluminum structures such as fuel tanks are prone to corrosion on any surface not open to the air. Any surface covered with wet or damp gear or carpet will need careful inspection of the plating.

Aluminum is also a material that can be overprotected by corrosion mitigation methods, particularly sacrificial anodes. Any indication of overprotection shall be noted with a detailed description in the report.

5.4 Wood and Less Common Materials for Hulls, Decks & Superstructures

The same basic inspection principles apply to wood and other hull materials. The goal of the marine surveyor remains to identify, through visual inspection and soundings, whether or not the structures are intact and sound.

5.4.1 Wood Structures

Soundings of wood vessels provide the same information as soundings on other materials, regardless of the type of wood or wood construction, including plywood or woods treated with resins or a combination of resin and cloth. Bright sounds indicate solid material, and suspect sounds may be indicative of varying degrees of deterioration. Slightly dull and dull sounds often indicate soft wood that has begun to decay. Any area presenting with dull or slightly dull soundings should be probed with an awl or screwdriver, to help establish the degree of deterioration. Caution should be exercised when interpreting relative moisture readings in wood structures, as the natural moisture content in most types of wood will show slightly elevated readings. Slightly elevated relative moisture readings in wood structures are therefore considered normal. With wood structures, determining the presence of structural implications of deterioration of a plank, panel, or frame is based on the criteria outlined in Table 5-7: Establishing the Degree of Deterioration of Wood Structures in Appendix A: Reference Tables at the end of this code of practice.

Vessels constructed of exposed planking and framing may be designed to take up water when afloat. When the wood swells, pressure increases on joints and related materials, helping make the vessel watertight. Wood will begin to deteriorate early in these designs, and the experienced wooden boat enthusiast will be aware of the constant need to replace significantly deteriorated planking and framing as the vessel ages. Wood is also a material that can be overprotected by corrosion mitigation methods, particularly sacrificial anodes. Any indication of overprotection, such as delignification around through-hull fittings, shall be noted with a detailed description in the report.

5.4.2 Ferro-Cement Structures

Ferro-Cement and other less common construction materials shall be approached in the same manner as other construction types. A combination of visual and physical (tactile) inspection shall be undertaken, and any deficiencies carefully recorded in the report. Electronic moisture detection methods are not suitable for assessing Ferro-Cement and other materials with conductive elements that will affect meter accuracy.

With structures made from less common construction materials, determining the presence of structural implications of deterioration shall be based on the general criteria outlined in Table 5-8: Establishing the Degree of Deterioration in Less Common Materials in Appendix A: Reference Tables at the end of this code of practice.

5.5 Deck Fittings and Hardware

5.5.1 Windshields, Windows, Portlights & Hatches

5.5.1.1 Windshields

Windshields shall be inspected for type and condition. Frames, panes, fastenings, hinges, and other attachments shall be inspected for damage and deterioration. Report descriptions shall include the type and configuration, location of installation, and the integrity of the windshield and installation, and the overall condition. A description of the number, location and condition of windshield wiper/washer

systems shall also be provided. Report descriptions shall also include operational status of powered components if tested.

5.5.1.2 Hatches

Hatches shall be inspected for type and condition, including frames, lenses, closures, supports, seals and proper function. Descriptions shall include the number, type and location of installation, and whether suitable for emergency egress. Report descriptions shall also include the integrity of the hatches and their installations, and their overall condition.

5.5.1.3 Windows, Skylights and Power Operated Sunroofs

The surveyor shall inspect for type and condition, including frames, lenses, closures, supports, seals, and proper function. If power operated sunroofs are tested for operation, the roof shall be fully opened and fully closed if conditions permit. Report descriptions shall include the type and installation locations, the integrity of the component and its installation, overall condition, and operational status if tested.

5.5.2 Deck Hardware

5.5.2.1 Railings, Lifelines, Stanchions and Handholds

The surveyor shall inspect for type and condition, including rails, mounts and fastenings. Measurements shall be taken for cap rail height and diameter, and intermediate railing spacing. Stanchions/mounts shall be tested for integrity of installation and compliance with load requirements of regulations and construction standards. Report descriptions shall include type and location of installation, construction materials, and integrity of components and installations. Measurements are not required to be published in the report, but pictures and notes of measurements should be retained for future reference.

5.5.2.2 Mooring Cleats and Bollards

Mooring hardware shall be inspected for type and condition. Report descriptions shall include type and construction materials, along with location and integrity of components and installation.

5.5.3 Interior, Cockpit and Accommodation Spaces

5.5.3.1 Companionways

Stairs and ladders shall be inspected for type and condition. Report descriptions shall include type, construction materials, locations of installation, integrity of components and installations, the presence of railings conforming to regulations and construction standards, and overall condition.

5.5.3.2 Interior Joinery, Doors and Hardware

Interior fittings shall be inspected for type and condition. Wood, wood laminates, or wood cored joinery and interior structures shall be inspected for elevated relative moisture readings that may indicate water intrusion into the cabin. Doors, drawers, pulls, latches and hinges shall be inspected for type and condition. Report descriptions shall include construction materials and integrity of components and installation.

5.5.3.3 Interior Headliners and Sole Coverings

The surveyor shall inspect for type and condition. Relative moisture readings shall be taken in areas where water intrusion is commonly found, such as in headliners below windshields and around portlights and windows, and in sole coverings below refrigeration units. Report descriptions shall include type and overall condition.

5.5.3.4 Soft Furnishings

Seat Cushions, mattresses, privacy curtains and non-fixed furnishings shall be inspected for type and condition. Report descriptions shall include type and overall condition.

5.5.3.5 Canvas and Soft Enclosures

Canvas covers and enclosures shall be inspected for type and condition. Surveyors should be aware of the impact of hazy/crazed vinyl windows the vessel operator's field of vision, particularly where the vessel has only one helm station. Report descriptions shall include type (mooring cover, trailering cover, full enclosure) and location of installation (bridge, cockpit, aft deck), and overall condition.

5.6 Appliances and Galley Equipment

Appliances shall be inspected for type, condition and compliance. Care shall be taken to identify unsecured components, damage, deterioration, and any deficiencies at electrical or fuel connections. Electrical components installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Report descriptions shall include type, manufacturer, location of installations, integrity of components and their installations, and operational status if tested.

5.7 Heating, Ventilation, and Air Conditioning Systems

HVAC systems shall be inspected for type, condition and compliance. Air conditioning and chiller units shall not be tested with the vessel hauled out of the water. If tested, reverse air conditioning units should be operated on both heat and cooling cycles if conditions permit. Very warm or very cool ambient temperatures may prevent accurate assessment of performance in one cycle. For example, cabin temperatures in excess of 25C may prevent evaluation of heat cycle operation. Conversely, cabin temperatures below 10C may prevent evaluation of cooling cycle performance. Electrical components installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Report descriptions shall include the number, manufacturer, and capacity of chiller units/air handlers, locations of installations, system voltages, integrity of components and their installations, and operational status if tested.

5.7.1 Heaters

Stand alone heaters for cabin and pilothouse interiors shall be inspected for type, condition and compliance. Engine coolant (bus type) heating units shall have cooling hoses inspected carefully for damage and deterioration. All accessible connections shall be carefully inspected. Electrical components installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Portable household electric heaters are not suitable for a marine application and shall not be left unattended if found connected for the surveyor's inspection. Portable household electric heaters shall be shut down/disconnected from the source of power prior to leaving the vessel, unless the vessel owner is present and acknowledges she/he is taking responsibility for turning the unit off. Report descriptions shall include type, installation locations, integrity or components and their installations, and operational status if tested.

PART 6: PROPULSION SYSTEMS

6.1 Standing & Running Rigging

Sailboat rigging has a limited life expectancy that is affected by a number of factors, including the amount and type of use, location of use, off-season storage arrangements, and maintenance practices. Any vessel over 30 years of age used primarily in a freshwater environment and suspected of having original standing rigging, shall be recommended for an independent rigging inspection by a qualified rigger. For vessels used in saltwater, the rigging inspection interval shall be reduced to 15 years, unless presenting condition dictates that a rigging inspection be conducted sooner.

Rigging shall be inspected from the deck only. For reasons of health and safety, surveyors shall not go aloft in a bosun's chair for inspection of rigging. The report should clearly state where and how the rigging was accessed for inspection.

6.1.1 Standing Rigging

6.1.1.1 Masts

The surveyor shall inspect masts for type and condition. Careful attention shall be paid to extrusions, fastenings, areas around fastenings, attachments such as yokes, winches, spreaders, sheaves, and any internal tracks, halyards, and furlers. Masts should be straight and true when inspected along their length. If stepped, masts should be securely fastened and roughly perpendicular to the main deck on visual inspection. Unstayed masts shall have mounting hardware carefully inspected for deterioration or damage. Report descriptions shall include the type, construction materials, location of installation (deck-stepped or keel-stepped), location of inspection, the number of spreaders, and integrity of masts and their installations, as well as overall condition. Where labeled, the brand and model of the mast shall be recorded in the report.

6.1.1.2 Mast Steps

Every mast step shall be inspected for type and condition. Mast steps must be securely fastened to the vessel, and the vessel structure to which they are attached must be intact and serviceable. Report descriptions shall include type and construction materials, location of installation, integrity of the mast step and installation, and overall condition.

6.1.1.3 Booms

Booms shall be treated similarly to masts. Careful attention shall be paid to extrusions, fastenings, attachments, and sheaves. Booms should be straight and true when inspected along their length. If installed to the vessel, the boom must be securely fastened to the mast. Report descriptions shall include the type, construction materials, integrity of booms and their installations, as well as overall condition. Where labeled, the brand and model of the boom shall be recorded in the report.

6.1.1.4 Stays and Shrouds

The surveyor shall inspect for type and condition. If the mast is stepped, shrouds and stays should be correctly tuned, without slack in the rods or wires. Rods and wires shall be inspected for any breaks or kinks, broken or unlayed segments. Mounting hardware and swages shall be carefully inspected for cracks, damage, tea-coloured corrosion staining (indicative of the development of crevice corrosion on stainless components), and any other indications of deterioration. Report descriptions shall include the type and construction materials (if known to the surveyor), locations of installation, and the integrity of the components and installation.

6.1.1.5 Chain Plates

Chain plates are problematic. Deterioration of chain plates often occurs in places not accessible for inspection. Sometimes the only indication of deterioration is tea-coloured corrosion staining (indicative of the development of crevice corrosion on stainless components) visible around the installation. In such cases, removal of chain plates for further inspection shall be recommended. Removal of chain plates is not included as a part of a C&V survey. Chain plates shall be inspected for type and condition. Report descriptions shall include the type, construction materials (where accessible), locations of installation, integrity of components and their installations.

6.1.2 Running Rigging

6.1.2.1 Boom Vang

The surveyor shall inspect for type and condition. Report descriptions shall include type, integrity of the components and the integrity of the installation.

6.1.2.2 Furlers

Furlers shall be inspected for type and condition. During sea trial, the furler should be observed for proper operation while underway, weather permitting. Report descriptions shall include the type, brand and model, the integrity of the furling unit and its installation, and operational status if tested.

6.1.2.3 Rigging Cleats

Cleats used for rigging shall be inspected for type and condition. Report descriptions shall include construction material, integrity of the cleats, and integrity of their installations.

6.1.2.4 Winches

Rigging winches may be manually or electrically operated and shall be inspected for type, condition and operation (where possible). Report descriptions shall include type, brand, model, integrity of the winch and installation, and operation (if tested).

6.1.2.5 Travelers

Travelers and tracks shall be inspected for type and condition. Report descriptions shall include the brand, type, and integrity of components and installation.

6.1.2.6 Clutches

Clutches shall be inspected for type and condition. Ideally, clutches should be labeled as to function. Report descriptions shall include the brand, type, and integrity of components and installation.

6.1.2.7 Blocks

Blocks and sheaves shall be inspected for type and condition. Sheaves should be rotated to inspect the circumference of pulleys, where accessible. Deterioration of sheaves, particularly plastic pulleys, is an indication to recommend replacement. Report descriptions shall include brands (where sighted), integrity of components and installations.

6.1.2.8 Halyards

Lines shall be inspected for type and condition, particularly for signs of wear such as cuts or fraying. Report descriptions shall include the type of construction material, if colour-coding has been employed, and the integrity of the ropes.

6.1.2.9 Sails

In many cases, sails will be bagged and conditions unsuitable for unfolding and re-folding the sails, particularly if a surveyor is working alone. The report shall indicate what was or was not undertaken with respect to sail inspection. Sails shall be inspected for type and condition. Material, seams and stitching, and battens shall be thoroughly visually inspected when accessible. Whenever conditions permit during sea trial, the surveyor should observe the sails fully unfurled and filled. Report descriptions shall include brand and type (including material, where such information is available), any history of repairs or refresh, stowage locations, extent of inspection, and integrity of sails and attachments.

6.2 Primary Powered Propulsion Systems

6.2.1 Engines and Running Gear

For the purposes of surveying, internal combustion engines and running gear of all types are to be inspected the same way. Engines and reduction gear components shall be inspected externally only. No disassembly of components shall be undertaken by surveyors under any circumstances. Following is a breakdown of engine systems and components. Under no circumstances shall an engine be started with the vessel hauled as part of a marine survey.

6.2.1.1 Castings and Mounts

Engine blocks, manifolds, oil pans, covers, brackets, and mounts shall be inspected for condition. Attention shall be given to the integrity and condition of the castings and protective coatings, as well as the integrity and secure installation of fasteners, particularly at engine mounts. Gasketed areas between castings and mounted accessories shall be inspected for visible leaks of any type. Engine block castings and exhaust manifolds shall be inspected visually for cracks, or indications of corrosion staining from inaccessible cracks. Heavily corroded castings with visible material loss should be inspected more thoroughly and probed with a screwdriver or awl to determine how much of the substrate is affected. During sea trial, engines shall be observed for active fuel, coolant, water, oil and exhaust leaks, unusual noises overheat situations (thermal imaging or infrared temperature measurements can be used to verify operating temperatures and isolated or general overheat conditions). Report descriptions shall include engine types, serial numbers and specifications, engine hours, the integrity of components and the engines' overall condition, as well as the operation/performance of the engines during sea trial.

6.2.1.2 Cooling Systems

Coolers, hoses, hose clamps, piping, valves and related componentry of the cooling systems shall be inspected for condition. Care shall be exercised to identify any deterioration of hoses or other components. Heavily corroded castings shall be probed for integrity. During sea trial, all components and fittings, including sea strainers, heat exchangers, hoses and gaskets, shall be inspected for leaks or impending failure. Report descriptions shall include system type, along with the integrity and overall condition of the system and related components, and the operational status of the system during sea trial.

6.2.1.3 Exhaust Systems

Elbows and related castings, Y-pipes, hoses and hose clamps, mufflers, bellows, and piping shall be inspected for condition. Turbochargers and dry exhaust components shall be visually inspected for integrity and physically inspected (while engines are cold) for movement in connections and integrity of piping and castings. Dry exhaust and turbochargers shall be inspected for proper insulating jacketing. During sea trial, exhaust components shall be monitored so as not to exceed temperatures as specified in applicable regulations and construction standards. Report descriptions shall include system type,

along with the integrity and overall condition of the system and components, and the operation of the system during sea trial.

6.2.1.4 Compartment Ventilation

Blower motors, ducting, fastenings, vent fittings and electric controls shall be inspected for condition and proper installation. When power is available (gasoline powered vessels), the blower(s) shall be tested for proper operation, with exhaust air confirmed at the external vent fitting. The system should also be evaluated for approximate capacity suitable for the application (size of engine space). Report descriptions shall include the number and voltage of blower motors, and the integrity and overall condition of the system and its components, and (when tested), proper operation of the system.

6.2.1.5 Oil Change Pumps

Pumps, hoses, fittings and electric controls shall be inspected for condition. Care shall be taken to identify leaks or potential oil contamination of bilge water. The surveyor is not expected to test the performance of an oil change pump during any C&V survey inspection. The surveyor may opt to power up the pump briefly, but care must be taken to avoid extraction of oil from any onboard engine or component. *Surveyors shall not use an onboard oil change pump to extract samples for oil analysis, as this method will result in spoiling of samples due to potential contamination of hoses as a result of residual oil in the system from other connected components.* Report descriptions shall include the brand, integrity and overall condition of the system, and if the system was tested and found to be operational.

6.2.1.6 Reduction Gear

Transmissions, V-drive units, mounts, couplers, transom shields/transom assemblies, outdrives, bellows, and related components, and outboard lower units shall be externally inspected for condition. Surveyors shall watch for deterioration of castings, paint coatings, mounts, fastenings, hoses and hose clamps, and fittings. Care shall be taken to identify leaks or damage. Heavily corroded castings shall be probed for integrity. During sea trial, the surveyor shall inspect for active leaks while underway, unusual noises or overheat conditions under load, and proper operation of shift functions. Report descriptions shall include type, manufacturer and model, ratio, serial numbers, integrity and overall condition of components, and if the components operate normally during sea trial.

6.2.1.7 Shafts and Shaft Seal Type

Shafts and seals shall be inspected for condition. Shafts shall be inspected visually, and rotated slowly where possible, for being true. During sea trial and where accessible, the surveyor shall inspect for shaft movement and vibration, and shaft seals shall be monitored for leaks at various shaft speeds. Report descriptions shall include shaft diameter and construction material, shaft seal type, and the integrity and overall condition of the shafts and seals, as well as a confirmation of proper operation while underway during sea trial.

6.2.1.8 Struts and Cutlass Bearings

Castings, mounts, fastenings, and cutlass bearings shall be inspected for condition. Struts shall be carefully inspected for deterioration, including cracks, corrosion, damage, and integrity of the installation and fastenings. Struts should be straight and true when viewed from the stern looking forward. Cutlass bearings shall be inspected for excessive wear, cracks, and any other indicators of deterioration, as well as integrity of installation. Report descriptions shall include the number, type, and construction material of struts, the integrity, installation location, and overall condition of the struts and cutlass bearings.

6.2.1.9 Propellers

Propellers, nuts, accessible spacers and key stock, and related installation hardware shall be inspected for condition. Care shall be taken to identify damage (impact, cavitation or corrosion related), loose or missing components (including loose propellers that are not properly seated and installed), and other indicators of deterioration. Report descriptions shall include the type, construction material, and specifications (if accessible) of the propellers, as well as the integrity and overall condition of the propellers and their installations.

6.2.2 Steering Gear

All hydraulic and mechanical steering systems shall be tested (where possible) for proper operation from lock-to-lock at all helm stations fitted to the vessel. In most instances, the steering system can be tested statically even with the vessel hauled. Care should be taken to watch for excessive slack or play in the steering system. Rudders, tie bars and mechanical linkages shall be inspected for integrity and any indications of damage and deterioration (from impact, cavitation, or corrosion), as well as the presence of water staining on the hull around the rudder bearings. Rudders should be straight and true when viewed from the stern looking forward. With the vessel hauled, rudders shall be manipulated by hand forward and aft, and port and starboard, to determine if the rudder shows mobility in the bearing. During sea trial, steering should be inspected for full operation to port and starboard, by having the vessel operator perform safe turns under load. Rudder bearings should be inspected for water seepage (leaks) during sea trial, if the rudders can be safely accessed below decks. Report descriptions shall include the type and configuration of the steering system, the number of helm stations, the number and type of rudders, construction material of rudders, and the integrity and overall condition of the system and its components, as well as the operating condition of the system during sea trial.

6.2.2.1 Hydraulic Steering Systems

Helms, pumps, castings, hoses, fittings, piping, and mechanical linkages shall be inspected for condition. Surveyors shall inspect for damage, deterioration, and leaks.

6.2.2.2 Mechanical Steering Systems

Helms, cables, pulleys, castings, fittings, fastenings and linkages shall be inspected for condition. Surveyors shall inspect for damage, deterioration, loose fastenings and linkages, and increased steering effort required at the helm.

6.2.2.3 Electronic Steering Systems

It may not be possible to properly test operation of an electronic steering system without conducting a sea trial, or without power to actuate systems. In addition, electronically controlled pod drives or outdrives shall not be tested with the vessel hauled, due to the potential for damage, or injury to other persons in the vicinity. In such situations, the system may be powered up but not tested.

6.2.3 Supplemental Propulsion Components

6.2.3.1 Bow and Stern Thrusters

Motor units (internal and external), connections, mounts, tunnels (internal and external), impellers (internal and external), and electric or electronic controls shall be inspected for condition. Internal tunnels shall be inspected for the proper installation, including smooth fairings without cracks or sharp edges and sufficient strength of installation. External tunnels shall be inspected for integrity of the housing, gaskets and installation fastenings. Impellers shall be inspected for damage or deterioration. Heavily corroded components shall be probed for integrity. During sea trial, thrusters shall be tested for proper operation in both directions. Thrusters shall not be operated with the vessel hauled, due to the risk

of injury of other persons in the boat yard. Report descriptions shall include the type, specifications, manufacturer and model and location of installation of thrusters, integrity of the systems and installations, and operational status if tested.

6.2.3.2 Trim Tabs

Pumps, lines, connections, tabs, cables, actuators, and electric or electronic controls shall be inspected for condition. Pumps, fittings and related components shall be inspected for leaks or damage. Tabs and actuators shall be inspected for damage or deterioration (impact and corrosion), and leaks at fittings or seals (hydraulic systems). Trim tabs shall be tested dynamically during sea trial, to ensure proper operation under load.

6.2.3.3 Stabilizers

External stabilizers shall be inspected for damage, water intrusion, and any structural inspection methods identified in Part 5 of this code of practice, based on the substrate materials. Internal stabilizers, including electronically controlled gyroscopic type stabilizers, shall be inspected for the integrity and compliance of the installation. During sea trial, stabilizers shall be tested where possible for proper operation. Report descriptions shall include the manufacturer, model, specifications, installation locations, integrity of the units and their installations, and operational status.

6.2.4 Oil Analysis

6.2.4.1 Independent Laboratory

Samples for analysis shall be submitted to an independent testing facility for evaluation of oil condition and the presence of any contaminants. Surveyors should select a laboratory that can consistently turn around samples and reports in less than one week.

6.2.4.2 Collection of Samples

Oil samples shall be collected in clean containers, preferably those provided for the purpose by the independent lab that will be conducting the analysis. Each sample shall be taken using a clean sample bottle and clean tubing, to prevent cross-contamination of samples. A designated oil extraction pump shall be used. An automatic oil change system fitted to a vessel should never be used for extracting oil samples. Care shall be exercised to prevent spillage and subsequent contamination of bilges. All spills shall be thoroughly cleaned up prior to leaving the vessel.

6.2.4.3 Submission of Samples

Basic oil change history information shall be collected whenever possible. Component type and location, oil type, date of last oil change, date of last filter change, type of filter (screen or element), total hours on unit and hours on oil should be included in submissions to the lab, or otherwise as requested by the lab, to ensure complete information. Samples shall be shipped to the lab within 24 hours of sample extraction.

6.2.4.4 Reporting

The survey report shall contain a statement of how many samples were extracted, and from which components, along with any other details pertinent to a specific case. Oil Analysis Reports shall be forwarded to the client and can be sent as a separate document, or embedded in the report, or as an attachment or addendum to the survey report. If included in the survey report, the oil analysis shall be clearly identified as having a different author.

6.2.5 Primary Propulsion Controls & Gauges

6.2.5.1 Shift and Throttle Controls

Control boxes, levers, and switches shall be inspected for condition and proper operation. Electronic controls cannot be tested for proper operation without engines running, therefore this task is not expected of the surveyor unless observed during sea trial. Mechanical controls shall be evaluated for necessary cable effort; however, care should be exercised not to shift outboard or stern drive gearcases without the engines running. As such, full operation of outboard and stern drive shift operation must be observed during sea trial. Report descriptions shall include the type and locations of installation, integrity of components and installations, and operational status if tested.

6.2.5.2 Emergency Shut-Off Switches

Switches and tethers (or lanyards) shall be inspected for condition and operation. Operation of emergency shut-off switches can only be verified with engines running, and therefore can only be determined during sea trial. Report descriptions shall include type and locations of installations, integrity of components and installations, and operational status if tested.

6.2.5.3 Gauges

Gauges shall be inspected for condition. Gauges may be powered up dockside if power is available, but testing of proper gauge function and accuracy will need to be completed during sea trial. Report descriptions shall include the types of gauges installed, manufacturer, integrity of gauges and installations, and operational status if tested.

6.3 Auxiliary Powered Propulsion Systems

Additional propulsion systems are covered in this section.

6.3.1 Internal Combustion Engines

Auxiliary internal combustion engines, regardless of fuel type, shall be treated as primary propulsion systems in terms of the detail of inspection and reporting requirements.

6.3.2 Electric Trolling Motors

Electric trolling motors shall be inspected for condition, including any presenting damage. Careful attention shall be paid to propellers, mechanical functions to raise and lower the motor assembly, fastenings and the condition of the structure to which they are secured. During sea trial, trolling motors shall be tested for basic operation. It is not expected of the surveyor to test advanced features such as GPS controlled position holding. Report descriptions shall include the manufacturer, model, specifications, location of installation, integrity of components and installation, and operational status if tested.

6.4 Electric Propulsion Systems

Electric propulsion systems shall be inspected for type, condition and compliance. The surveyor should be aware of high voltage components and the safety risks presented. The surveyor shall not open up high voltage enclosures as part of a C&V survey inspection. Gasoline fuel tanks (including portable fuel containers) should not be installed or stowed in electric propulsion system component spaces, due to ignition protection considerations. Care should be exercised to identify overcurrent protection compliance. Testing of electric propulsion systems shall be limited to operation observed during sea trial. Report descriptions shall include the type, manufacturer, model, operating voltage, battery configuration, connections (and compliance) of shore power to dedicated charging and inverting components of the

electric propulsion system, integrity of components and their installations, and operational status if tested.

PART 7: HULL PIPING, PUMPS AND TANKAGE

7.1 Propulsion Fuel Systems

A description of the propulsion fuel system in the survey report shall include the fuel type (gasoline, diesel, or other fuel type). During sea trial, all parts of the system shall be carefully monitored for active leaks or weeping fuel. Particularly in the case of a leaking gasoline fuel system, a sea trial may need to be aborted.

7.1.1 Fuel Tanks

Tanks and fittings shall be inspected for condition and compliance where accessible, with careful attention paid to any signs of damage, deterioration, or leaks. Report descriptions shall include the number, locations and construction materials of tanks, as well as the integrity of the tanks and their installations.

7.1.2 Fuel Hoses and Piping

Hard piping, flexible hoses, connections, fittings and clamps shall be inspected for condition and compliance where accessible, with special attention paid to any signs of damage or deterioration, improper installation, improper hose type, or leaks. Report descriptions shall include whether hoses are compliant, and the integrity of components and their installations.

7.1.3 Deck Fill Fittings

Decks fills shall be inspected for condition, with attention paid to the O-ring or seal to prevent water intrusion to the fuel system. Report descriptions shall include the number, location and construction material of fittings.

7.1.4 Fuel System Grounding

Inspection shall be focused on compliance with construction standards, along with the condition of any grounding wires fitted to tanks and deck fill fittings. Report descriptions shall include a comment on whether or not the system is compliant.

7.1.5 Fuel Valves

Fuel valves shall be inspected for condition and compliance. Valves shall be cycled and observed for leaks or weeping from valve bodies and fittings. Electrically operated valves in a gasoline engine or fuel tank space shall be ignition protected. Report descriptions shall include the integrity of the valve bodies and their mounting locations, along with operational status if tested.

7.1.6 Fuel Filters

Particulate and water separating filter shall be inspected for condition and compliance. Canister type filters shall be checked for loose installation on the threads, along with any seepage of fuel. Report descriptions shall include the type and integrity of filters, housings and installations.

7.1.7 Fuel Pumps

This subsection includes high-pressure and low-pressure fuel supply pumps and fuel transfer pumps. Engine mounted and vessel mounted pumps shall be inspected for condition and compliance, with extra care given to inspecting for leaks around the pumps, seals and gaskets. Electrically operated fuel pumps in a gasoline engine or fuel tank space shall be ignition protected. Report descriptions shall include pump

type, the integrity of fuel pumps and related fittings, mounts and fastenings, along with operational status if tested.

7.1.8 Tank Monitors

Tank level monitors shall be inspected for condition. During dockside testing, level monitors can be powered up but may be difficult or impossible to determine full operation. Report descriptions shall include type and location of gauges, type of sending units, along with the integrity of components and installations, and operating status if tested.

7.2 LPG (Propane) and CNG (Natural Gas) Systems

7.2.1 Stowage of Cylinders

Regardless of system type, cylinder storage is an important consideration. Portable or non-permanent systems without a dedicated locker may have several small 454g (1 lb.) portable cylinder stowed onboard. These cylinders are often stowed in the cabin or cockpit areas. Frequently, a surveyor will find other gear stowed in the same compartment, including electrical components that might not be ignition protected. Even in the absence of a dedicated and compliant locker, cylinders should be stowed in locations without other gear, without electrical components, and where vapours can flow directly overboard.

7.2.2 Non-Permanent LPG (propane) Systems

For the purpose of this code of practice, non-permanent systems refer to any propane system that is self-contained, with no components installed to the vessel interior (cabin or enclosed cockpit area), would not require tools to remove the system from the vessel, is dedicated for the purpose of fueling an externally mounted cooking appliance (barbecue or grill not installed in an enclosed area), and in most cases would be considered a portable system that uses small 454g (1lb.) camping style LPG cylinders.

7.2.3 Permanently Installed Systems

Vessels fitted with a permanently installed propane or natural gas fuel systems shall be inspected for type, condition and compliance. Small Vessel Regulations (SVR) do not specifically regulate either system type. The SVR references only best practices related to non-specific standards. For the purpose of vessel safety, this can and should be extended to the ABYC Standards related to propane and natural gas systems and appliances. As there no specific legislated requirements, the surveyor is at liberty to provide an opinion on the importance and urgency of any findings related to these systems, but any recommendations remain non-regulatory in nature.

7.2.3.1 Tanks

Tanks shall be inspected for type and condition, as well as compliance of installation. Special attention should be paid to provisions for securing the tank, and any presenting damages or deterioration (paint coating failures and the development of corrosion on the tanks or fittings). If accessible, the certification date of the tanks should be noted. Report descriptions shall include the type, construction materials, and locations of installation of the tanks, along with the integrity of tanks, coatings, fittings and installations.

7.2.3.2 Regulators

Regulators shall be inspected for type and condition. Where a two-stage regulator with gauge has been installed, the propane system shall be checked for leakdown by opening the tank valve with the main shut-off solenoid valve in the open position (to permit fuel flow to any onboard appliances) and the valves on appliances (burners or pilot lights) shut off, observing the initial tank pressure and recording any pressure drop over a specified period of time (usually 10 minutes). Flexible hoses shall be manipulated by hand,

particularly near fittings and connection points, and the surveyor shall observe the system for audible leaks or fuel odours. In cases where a single stage regulator is installed, the surveyor shall record in the report that a leakdown test was not possible. Report descriptions shall include the type and location of the regulators, whether fitted with a gauge, and the integrity of the regulators and their installations.

7.2.3.3 Hoses and Piping

Accessible flexible hoses and hard piping shall be inspected for type and condition. Care shall be taken to inspect for chafe protection, wear, deterioration, damage, and suitability of construction materials. Where possible with the system pressurized, hoses and hard fuel lines shall be manipulated gently near fittings to check for audible leaks. Report descriptions shall include the types, construction materials and locations of flexible lines and hard lines installed to the vessel, any areas not accessible for inspection, along with the integrity of fuel lines, fittings and their installations.

7.2.3.4 Lockers

Lockers shall be inspected for type, condition and compliance. Tanks shall be removed from lockers where necessary to confirm compliant venting. Report descriptions shall include the number and location of lockers, along with the integrity and compliance of the installations.

7.2.3.5 Electric Solenoid Valves

Electric shut-off valves shall be inspected for type and condition. Where power is available to permit valve testing, operation shall be tested with the system charged (main valve at tank open). With the electric solenoid valve in the off position, a valve (or burner, in the case of a range or oven) shall be opened to bleed residual gas from the fuel line between the electric solenoid valve and the appliance. A brief, temporary discharge of gas should be audible, not lasting longer than a few seconds. With the valve at the appliance open, the electric solenoid valve can be cycled on and off, and operation of the electric solenoid valve can be confirmed through the audible passage of gas through the appliance. Alternatively, and if the appliance (burner) is ignited to test for proper operation, the electric solenoid valve can be switched off to confirm its operation. The flame should extinguish quickly after shutting off the electric solenoid valve. Care should be taken to assess the location of installation of the electric solenoid valve, and any installation requiring a reach across the top of a cooking appliance to activate the switch shall be considered unsafe. Report descriptions shall include the type and location of the electric solenoid valve, along with the integrity and compliance of the valve and installation, and operational status if tested.

7.3 Potable Water Systems

7.3.1 Pumps

Pumps shall be inspected for type and condition. Electric pumps installed in gasoline engine or fuel tank spaces shall be confirmed as ignition protected. If the water system is to be tested as part of the survey inspection, it must be fully commissioned, and water pressure should be confirmed at all tap sets. Decommissioned systems with available electrical power may permit a brief power up of the pressure pump(s), but care should be exercised to avoid prolonged dry running of the pump that may cause damage. Report descriptions shall include pump type and location, compliance, along with integrity of the pump(s) and installations, and operational status if tested.

7.3.2 Filtration

Filters and filtration systems shall be inspected for type, condition and compliance. Electrically operated components in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Filters shall be inspected carefully for damage, deterioration and leaks. UV and desalinator filtration systems are not

routinely tested. In cases of purchase surveys where the client is requesting testing, manufacturer's instructions shall be followed to prevent damage to systems. Report descriptions shall include the type and location of equipment fitted, along with the integrity of components and their installations, and operational status if tested.

7.3.3 Tanks

Water system tanks and accumulator tanks shall be inspected for type and condition. Report descriptions shall include the number, type, construction materials and locations of tanks, along with the integrity of tanks, fittings and installations.

7.3.4 Deck Fill Fittings

Deck fill shall be inspected for type and condition. Report descriptions shall include the number and type of deck fills, construction materials, and the integrity of fittings, caps and installations.

7.3.5 Shore Water Fittings

Shore supplied water system connections shall be inspected for type and condition. Effort shall be made by the surveyor to identify any pressure reducing fittings below decks, though these fittings are often near impossible to access, or they are absent altogether. Report descriptions shall include the type and location of installation, the integrity of accessible components and their installations, the presence of a pressure reducing fitting, and if tested.

7.3.6 Hoses and Fittings

Hoses shall be inspected for type, compliance and condition. Care should be taken to inspect for leaks or incorrect fitting types, dissimilar metals in connections that may give rise to corrosion, damage, deterioration and wear. Report descriptions shall include integrity of components and their installations.

7.3.7 Water Heaters

Water heaters, or hot water tanks, shall be inspected for type and condition. Electrically operated components in gasoline engine or fuel tank spaces shall be confirmed as ignition protected. Care should be taken to inspect fittings and connections for compliance at the tank or heater, particularly electrical connections. Water heaters shall not be powered up on decommissioned systems (unless only briefly to confirm power draw at the AC panel board) due to the risk of damage to heating elements and related components. If the water system is commissioned and the water heater is to be tested, water heaters with engine coolant loops shall have their electrical elements tested at dockside prior to warming up the propulsion engines. Report descriptions shall include the manufacturer, type, voltage, capacity, location of installation, presence of an engine coolant loop, integrity of the tank/heater and its installation, and operational status if tested.

7.3.7.1 Pressure Relief

In most cases, the pressure relief valve installed in a hot water tank is the only pressure relief in the water system. The valve shall be inspected for compliance. Report descriptions shall include the rated pressure of the valve and whether it conforms with voluntary standards.

7.3.8 Tank Monitors

Level monitors for the potable water system shall be inspected for condition. Testing for full operation may not be realistic as part of a marine survey unless the water system is filled from empty during the survey inspection. It is not expected of the surveyor to recommission or fill the system as part of a survey.

Report descriptions shall include the location and integrity of the system and installation, along with operational status if tested.

7.4 Sanitation Systems

7.4.1 Pumps

Vacuum, macerator and discharge pumps shall be inspected for type and condition. Electric pumps installed in gasoline engine or fuel tank spaces shall be confirmed as ignition protected. If the water system is to be tested as part of the survey inspection, it must be fully commissioned, and water pressure should be confirmed at all tap sets. Decommissioned systems with available electrical power may permit a brief power up of the system pump(s), but care should be exercised to avoid prolonged dry running of the pumps that may cause damage. Report descriptions shall include pump type and location, compliance, along with integrity of the pump(s) and installations, and operational status if tested.

7.4.2 Vent Filtration

Holding tank vent filters shall be inspected for location and condition. If tested, flushing of onboard toilets will usually be sufficient to determine if odours are contained. Report descriptions shall include the number and locations of vent filters.

7.4.3 Tanks

Vacuum, grey water and holding tanks shall be inspected for type and condition. Report descriptions shall include the number, type, construction materials and locations of tanks, along with the integrity of tanks, fittings and installations.

7.4.4 Overboard Discharge

Components of the overboard discharge system shall be inspected for condition, as well as compliance based on location of use. Near shore and inland lakes applications require the system to be locked out or disconnected such that sewage cannot be inadvertently discharged overboard. A surveyor should not be undertaking overboard discharge system testing as part of a survey. Pumps can be powered up briefly to confirm basic operation, but care must be taken not to discharge sewage as part of the test. Electric pumps installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include type and location installation, along with integrity of components and installation.

7.4.5 Deck Pump Out Fittings

Fittings shall be inspected for type and condition. Report descriptions shall include the number and type of deck fills, construction materials, and the integrity of fittings, caps and installations.

7.4.6 Tank Monitors

Level monitors for the sanitation system shall be inspected for condition. Testing for full operation may not be realistic as part of a marine survey unless the holding tanks are pumped out from full during the survey inspection. It is not expected of the surveyor to pump out the system as part of a survey. Report descriptions shall include the location and integrity of the system and installation, along with operational status if tested.

7.4.7 Toilets

Toilets shall be inspected for type and condition. Care shall be taken to ensure the toilets are properly secured to the vessel, with no leaks from gaskets and fittings. If vacuum type toilets are to be tested, they

should be flushed with the vacuum pump system powered up, and the surveyor should listen carefully for repeated cycling of the vacuum system, which may indicate a leak in the system. Report descriptions shall include the type of toilets fitted, the integrity of the toilets, related components and their installations, and operational status if tested.

7.4.8 Shower Sumps

Sump pumps and sump boxes shall be inspected for condition. Testing of sump pumps with automatic float switches is not included in a C&V survey. Electric pumps installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include the number and location of sumps and pumps, the integrity of components and their installations, and operational status if tested.

7.5 Additional Pumps and Piping Systems

7.5.1 Washdown Systems

Washdown pumps and related components shall be inspected for type and condition. When testing systems supplied by seawater care shall be taken to ensure the seacock is open to prevent damage to the pump. Dynamic operation can only be tested by checking for water pressure at each spigot. Care shall be taken to identify any leaks, damage, deterioration and non-compliant components. Electric pumps installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include the pump manufacturer and type, the number of pumps, the integrity of the pumps, fittings, hoses, filtration and their installations, locations of components, along with operational status if tested.

7.5.2 Air Conditioning Pumps

Raw cooling water pumps for air conditioning and chiller units shall be inspected for type and condition. Pumps are typically of a non-self-priming type in most production pleasure craft and cannot be tested with the vessel out of the water. Where a vessel has been hauled for bottom inspection, air conditioning pumps will often need repriming once the vessel has been launched. Priming air conditioning pumps is considered part of the commissioning process and is not the responsibility of the surveyor. Electric pumps installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Care shall be taken by the surveyor to identify leaks, wear, damage and deterioration. Proper component testing shall include observation of air conditioning discharge water with air conditioners/chiller units operating. Report descriptions shall include the number and type of pumps, manufacturer(s), locations of installation, system voltages, types of filtration and location of through-hull(s), the integrity of system components and their installations, and the operational status if tested.

7.5.3 Wet Ballast Systems and Livewells

In many cases of wet ballast system installations on pleasure craft in Canada, the purpose of the system is for water sports such as wakeboarding and wakesurfing. For the purposes of a C&V survey, both wet ballast systems and livewells/baitwell systems can be handled the same way. Pumps, tankage, hoses and fittings shall be inspected for type and condition. Electric pumps installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include the number, type and locations of pumps and tanks, the integrity of components and their installations, and the operational status if tested.

7.6 Hydraulic Fluid Tanks and Piping

Hydraulic systems take many forms. In many instances, hydraulic components will be automatically reported as a part of other componentry. For example, power trim systems on stern drives are considered integral to the propulsion system and do not require a specific entry regarding hydraulics. In other instances, hydraulic systems may be independent and may supply more than one component with power, such as a dedicated hydraulic system that runs both a bow thruster and an articulated aft swim platform. In all cases, hydraulics are to be inspected for type and condition. Care shall be taken to identify leaks, damage, deterioration and wear (including coating failures and corrosion). Electric pumps installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Where systems are tested, and where practicable to do so, components shall be operated through their full range of operation. Report descriptions shall include a basic description of the system configuration, pump types and manufacturers, location of tanks and pumps, the integrity of components and their installations, and operational status where tested.

7.7 Seacocks, Through-Hulls and Drainage

7.7.1 Through-Hull Fittings

This section also refers to through-hull fittings above and below the maximum heeled waterline, as is common in sailing vessels. Fittings shall be inspected for type and condition. Care shall be exercised to identify any fittings not fully seated to the hull, particularly those where water is ejected from behind the flange when tapped gently with a phenolic hammer. The surveyor shall also watch for indicators of damage and deterioration. Extra care shall be taken to inspect the inner lumen of the fitting for cracks that may indicate imminent failure, which may occur at the flange or mounting collar, particularly on plastic fittings. Where accessible from inside the hull below decks, fittings shall be sighted and physically manipulated (an attempt to move or unseat the fitting by hand). Hose fittings and hose clamps shall also be inspected for condition. Exterior inspection of fittings shall be completed with the vessel hauled out of the water. Report descriptions shall include the types and construction materials of fittings installed, and the integrity of components and their installations. A through-hull diagram is not a required component of a C&V survey report.

7.7.2 Seacocks

For the purposes of this code of practice, a seacock is defined as a means of positively shutting off a through-hull fitting, and may be of several types/designs. Seacocks shall be inspected for type, condition, and compliance. Seacocks shall, where safe and practicable to do so, have their valves cycled through the full range of operation during any and all forms of C&V survey inspection. Any electrically operated actuators installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Report descriptions shall include the types of seacocks installed, the integrity of components and their installations, and operational status if tested.

7.7.3 Hull Drains

Drain fittings shall be inspected for type and condition. Report descriptions shall include the type, construction materials of fittings, and locations of installations, along with the integrity of components and their installations.

7.7.4 Freeing Ports and Scuppers

Ports and fittings shall be inspected for type and condition. Surveyors shall be careful to inspect for damaged, deteriorated or occluded drains, intact hoses and fittings. Report descriptions shall include the

type, construction materials and locations of installations, and the integrity of components and their installations.

PART 8: ELECTRICAL SYSTEMS

8.1 Electrical Safety

Extreme caution shall be exercised when working around all electrical systems. Systems shall be powered down/disconnected from the source of power prior to opening of any panel boards or enclosures containing uninsulated current-carrying connections. Surveyors shall work within the limitations of their knowledge and skillsets. In cases where a surveyor lacks sufficient knowledge or skill to undertake a specific testing regimen, the surveyor shall not undertake such testing. If the testing is indicated as a recommended test within the scope of this code of practice, the surveyor may opt to identify that a test is recommended, and that a qualified Marine Electrical Technician be retained to undertake such tests. Under no circumstances shall a surveyor attempt to perform tests on live electrical equipment (other than confirming basic operation of a powered component) where injury to persons or damage to equipment may result.

8.2 Electrical Systems Inspection (All Types)

8.2.1 Panel Boards and Overcurrent Protection

Panel boards and fuse blocks shall be inspected for type, condition, and compliance. Battery banks, mains and branch circuits shall be inspected for sufficient type, rating and ampere interrupting capacity (AIC). Care shall be exercised to identify instances of non-compliance, damage, and deterioration. Surveyors should consider use of infrared thermometers or thermal imaging cameras to help identify areas of concern such as increased heat from poor or corroded connections. Powered individual components or groups of components showing temperatures in excess of 60C (generally considered to be hot the touch, in the absence of a temperature measurement device) shall be identified as a deficiency requiring further investigation. Conditions of premature/frequent tripping of breakers or other OCP devices shall also be flagged for further investigation. Electrical components installed in gasoline engine or fuel tanks spaces shall be confirmed as ignition protected. Report descriptions shall include type and locations of panel boards and OCP devices, integrity and compliance of components and their installations, and operational status if tested.

8.2.2 Wiring and Connections

Wiring and connections shall be inspected for type, condition and compliance. Cable ends at connections can often be accessed to determine conductor type. Care shall be taken to identify damage, deterioration, printed identification markings, sufficient support, sufficient size for the application, secure and compliant connections. Wiring and connections showing temperatures in excess of 60C (generally considered to be hot to the touch) shall be identified as a deficiency requiring further investigation). Report descriptions shall include condition and compliance.

8.3 Direct Current Systems (50 Volts or Less)

Basic system descriptions shall include system type, voltages and ground polarity.

8.3.1 Main Disconnects

Battery master switches shall be inspected for type and condition. Surveyors shall inspect switches and related connections for damage, deterioration or other deficiencies. Battery switches installed in gasoline

engine or fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include the number and location of battery switches, the integrity of components and their installations, and operational status if tested.

8.3.3 Batteries

Batteries and battery banks shall be inspected for type, voltage, condition and compliance. Battery testing is not required during a C&V survey inspection. Considerations shall be given to suitability of battery installations and installation environments based on battery type. An electronic temperature measurement device (such as an infrared thermometer or thermal imaging camera) may be used to quantify battery temperatures during charging. Battery temperatures in excess of 60C during charging (generally considered to be hot to the touch) shall be identified as a deficiency requiring further investigation. Sea trials shall be aborted or postponed if battery voltages drop below 90% of rated voltage (10.8 volts battery voltage in a 12-volt system) with battery chargers shut-off or disconnected for a period of ten minutes, to avoid the risk of stranding the vessel during sea trial. Lithium type variations shall be inspected to confirm the presence of a battery management system (BMS). Report descriptions shall include the number of batteries of each size and type, locations of installations, voltages and connection configurations, integrity of components and installations, and operational status during onboard system testing.

8.3.4 Alternators

Alternators shall be inspected for type and condition. Alternators and voltage regulators installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Alternator output tests are not required as part of a C&V survey. The surveyor shall, however, observe DC voltages without battery chargers connected and without engines running, in order to compare with voltages present *with* engines running, which should help indicate alternators are functioning as intended. Specific values are not published in this code of practice. Voltage specifications can be verified by the alternator manufacturer. Report descriptions shall include the number, type and output specifications, the integrity of components and their installations, and operational status if observed with engines running.

8.3.5 Battery Isolators and Charging Relays

Isolators and charging relays (ACRs and VSRs) shall be inspected for type, condition and compliance. Surveyors are not required to test isolators and charging relays as part of a C&V survey. Electrical components installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include the number, type and location of devices, and the integrity of components and their installations.

8.3.6 Solar and Wind Powered Charging Systems

Solar and wind systems shall be inspected for type, condition and compliance. Extra care should be taken by the surveyor when inspecting solar and wind powered charging systems, as they are often installed as a DIY project by boater unfamiliar with electrical standards. Surveyors are not required to test solar system output, but the system may be powered up and charge controller functions observed if power is available from the solar panels, and if the batteries and the DC system are connected and intact. Electrical components installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. DC wiring connected between charge controllers, OCP devices and battery banks must be compliant with the same requirements applicable to other DC wiring onboard the vessel. Aluminum framed fixed solar panels should be compliant with case/chassis grounding requirements of the construction standards. Wind generators shall be installed to a suitable height to prevent injury to persons from rotating blades. Report descriptions shall include system type, manufacturer, charge controller

model, number, type and location of panels or generating components, system output specifications, the integrity of components and their installations, and operational status if tested.

8.3.7 Battery Paralleling Switches

Battery parallel switches, or emergency parallel switches, along with solenoids, shall be inspected for type and condition. A click of the solenoid or relay should be audible when engaged. Switches should be of a momentary type. Report descriptions shall include the type and location, integrity of components and installations, and operational status if tested.

8.3.8 12-Volt Power Points

Power points shall be inspected for condition. The surveyor is not required to test 12-volt power points as part of a C&V survey inspection. Report descriptions shall include the number of power points, locations of installations, and the integrity of components and installations.

8.4 Alternating Current Systems (Over 50 Volts)

Basic system descriptions shall include system types and voltages.

8.4.1 Connections to Shore Power

Inlet receptacles at the vessel shall be inspected for type, condition and compliance. Surveyors shall confirm the shore power inlet receptacles fitted to metallic or carbon fibre structures are electrically insulated from the vessel (not grounded or bonded to the vessel). Care shall be taken to identify loose installations, broken weather covers, broken or missing lock rings on shore cords, and loose or burned terminals on the plug and receptacle. The shore cord(s) shall be disconnected at the dock pedestal, and the absence of power shall be confirmed at the main shore power panel board voltmeter prior to removal of the shore cord plug from the vessel receptacle for inspection. With the shore cord disconnected and the main ship/shore switch set to shore power, a neutral-to-ground connection test shall be performed (please note that the presence of a properly installed inverter with automatic grounding switch, or the presence of an isolation transformer onboard the vessel, may result in continuity through the neutral-to-ground connection). On vessels without a permanently installed inverter or isolation transformer, there should be no continuity between AC neutral (white) and the safety ground (green) conductors. Report descriptions shall include the type, voltage and amperage specifications, the locations of the shore power connections at the vessel, compliance of the neutral-to-ground connection, the integrity of components and their installations, and the operational status if tested.

8.4.2 Main Disconnects

Shore power main breakers shall be inspected for type, condition and compliance. Surveyors shall inspect breakers and related connections for damage, deterioration or other deficiencies, as well as proximity to the shore power inlet receptacle they have been installed to protect. Remote switches with high current solenoids or relays installed in gasoline engine or fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include the number and location of shore main breakers, the integrity of components and their installations, and operational status if tested.

8.4.2.1 Equipment Leakage Circuit Interruptors

ELCI/RCD devices shall be inspected for condition and compliance. They have been a requirement of newly constructed small vessels in Canada since April 2010 but should be a recommended upgrade on all vessels fitted with shore power, regardless of age. ELCI/RCD devices are typically fitted with a test and reset function and shall be tested by the surveyor where power is available. ELCI/RCD devices installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected.

8.4.3 120-Volt Receptacles

Receptacles shall be inspected for type, condition and compliance. Surveyors shall flag deficiencies such as missing faceplates, loose receptacles or connections, loose wiring at entrances to junction boxes, and any conditions of damage or deterioration. Receptacles shall be tested for correct polarity where power is available. All receptacles (GFCI or otherwise) installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include the type, locations of installations,

8.4.3.1 GFCI Receptacles

Ground fault circuit interruptor (GFCI) type receptacles shall be tested for proper operation where power is available. Non-GFCI receptacles in areas subject to potential weather or water spray, when protected by a GFCI receptacle in the same circuit, shall be confirmed as protected by the GFCI device in the circuit where power is available for testing. It is recommended to use the test and reset buttons on the GFCI device, rather than the test button on a portable polarity testing tool.

8.4.3 Battery Chargers & Inverters

Battery charges and inverters shall be inspected for type, condition, and compliance. Battery chargers, inverters and related electrical components installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected.

8.4.3.1 Battery Chargers

Chargers shall be inspected for damage, deterioration and compliance issues. Care shall be taken to identify overcurrent protection, chassis/case grounding/bonding requirements, suitable locations of installations. Battery chargers do not need to be tested thoroughly for output, but can be powered up and battery voltages monitored to show basic charger operation. Report descriptions shall include type, manufacturer and model, locations of installations, output specifications, the integrity of components and their installations, and operational status if tested.

8.4.3.2 DC-to-AC Inverters

Inverters shall be inspected for damage, deterioration and compliance issues. Care shall be taken to identify overcurrent protection (including sufficient capacity and AIC rating), chassis/case grounding/bonding requirements, suitable locations of installations, and the presence of warning labels at the shore power panel board. Inverters do not need to be tested thoroughly for output, but can be powered up and have AC sample loads tested for basic operation. Report descriptions shall include type, manufacturer and model, locations of installations, output specifications, the integrity of components and their installations, and operational status if tested.

8.4.4 Isolation/Polarization Transformers

Despite variations in safety ground configuration, isolation transformers and polarization transformers accomplish largely the same function. These components shall be inspected for type, condition and compliance. Transformers installed in gasoline engine and fuel tank spaces shall be confirmed as ignition protected. The surveyor is not expected to thoroughly test these components, and covers shall not be removed for inspection. If power is present at the panel board with the vessel plugged into shore power, the transformer is considered to be operational. Report descriptions shall include the type and location of installation, the manufacturer, model and specifications, the integrity of the components and their installations, and operational status if tested.

8.4.5 Generators

Generators shall have their engines and power generating units inspected for type, condition and compliance. Engines shall be inspected in accordance with the propulsion engine requirements of this code of practice. Electrical components of the generator shall be inspected in accordance with the electrical systems requirements of this code of practice. In situations where a generator is to be tested dynamically, the surveyor shall make sure that the vessel is afloat with the generator raw colling water seacock open prior to starting the engine. Once started and prior to undertaking any output testing, the surveyor shall visually and audibly confirm generator cooling water overboard discharge is present with the engine running. The surveyor shall abort testing in any situation where cooling water discharge cannot be confirmed, in order to avoid potential overheat damage. The generator engine shall be warned up prior to load testing.

When tested, the generator should be fully loaded (as many inductive and resistive loads as the vessel can draw). The surveyor shall monitor the main AC panel board for voltage drop, and shall monitor the engine for loss of rpm, surging, overheat, and any other unusual presentations. Report descriptions shall include fuel type, manufacturer, model, serial number, engine hours, output specifications, locations of installations, integrity of components and their installations, and operational status if tested.

8.4.6 Power Conversion and Power Conditioning Equipment

Shore power converters, electrical interlocking, backfeed protection devices, paralleling devices for multiple AC power sources, three phase AC power systems, power conditioning equipment, and any AC electrical system operating at higher than 250 volts is considered beyond the scope of the marine surveyor's inspection. Inspection shall be limited to visual condition and installation compliance, unless the surveyor holds ABYC Advanced Marine Electrical Certification. Report descriptions shall include type, manufacturer and model, component specifications, location of installations, integrity of components and their installations, and operational status if tested (by a qualified and certificated surveyor).

8.4.7 Digital Switching Systems

Digital switching systems (DSS) shall be inspected for type, condition and compliance. Most of these systems are programmable and cannot be tested beyond basic user functions. Internal components and functions not governed by any specific construction standards shall be evaluated against the manufacturer's installation and operating instructions. Electrical and electronic components installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Report descriptions shall include the type, manufacturer, model, location of installation, a basic description of vessel functions controlled by the DSS, the integrity of components and their installations, and operational status if tested.

8.5 Corrosion and Corrosion Protection Systems

This section encompasses how a surveyor is expected to handle identification of the types and extent of corrosion across multiple vessel structures and systems, as well as the systems designed and installed to mitigate or prevent corrosion. This section presumes the surveyor has a basic understanding of corrosion and prevention systems. The surveyor is not expected to undertake voltage potential readings as part of a C&V survey inspection.

8.5.1 Corrosion Types and Reporting of Deficiencies

Various types of corrosion are often seen in several locations across a vessel, particularly those exposed to saltwater environments. For the purposes of this code of practice, corrosion is defined as material loss from a metal or metal alloy. In cases where there are several indicators of the development of corrosion that span across multiple structures and/or multiple systems, it is most effective to report such findings

in a single section of the report. This approach can help eliminate duplication of statements in the report, as well as permitting a single recommendation addressing corrosion systemically. For example, a collection of corrosion findings that point to deterioration from saltwater use may be best presented as a single finding in the report.

8.5.2 Sacrificial Anodes

Anodes shall be inspected for type and condition. It may not be possible for a surveyor to determine the construction material of a sacrificial anode. As a rule, anodes shall be considered partially wasted if showing signs of having lost a portion of the anode material and shall be considered significantly wasted if 50% or more of the anode is missing. It is not a part of a C&V survey inspection to determine the required number and correct installation locations of sacrificial anodes. Nonetheless, missing anodes, wastage, improper installation, painting of anodes, and any areas of the vessel showing signs of underprotection or overprotection shall be noted. Report descriptions shall include the installation locations of anodes, along with the integrity of the anodes and their installations.

8.5.3 Impressed-Current Corrosion Prevention Systems

ICCP systems shall be inspected for type and condition. The surveyor is not expected to test electrical/electronic components of the ICCP as part of a C&V survey inspection. Continuity wires shall be inspected carefully on transom shields/transom assemblies of stern drive powered vessels. Electrical/electronic components of the system installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Report descriptions shall include the type and manufacturer of the system, the integrity of components and their installations.

8.5.4 Galvanic Isolators

Galvanic isolators shall be inspected for type, condition and compliance. The surveyor is not required to test a galvanic isolator as part of a C&V survey, as proper component isolation requires disconnection of wires beyond the scope of inspection. Further, failure to use the diode test function of a DVOM can result in damage and failure of the galvanic isolator, a condition that mat not be evident to the surveyor at the time of testing. Care should be taken to identify installation issues such as loose connections. Galvanic isolators installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Report descriptions shall include the location of installations, manufacturer, type, and rated amperage capacity, integrity of components and their installations.

8.5.5 Protective Coatings

Protective coatings on hulls (does not include anti-fouling paints), engines, reduction gear housings, thruster housings, generator enclosures, trim tabs and other components that may be subject to corrosion shall be inspected for type and condition. Care shall be taken to identify damage, deterioration and coating failures, along with the development of corrosion on substrates. The surveyor is not expected to recognize all types of coatings by sight, nor is the surveyor expected to perform coating thickness measurements as part of a C&V survey. Report descriptions shall include components with protective coatings applied, and the integrity of coatings.

PART 9: NAVIGATION, COMMUNICATIONS AND ENTERTAINMENT ELECTRONICS

9.1 Inspection Guidelines

Navigation and communications electronic components shall be inspected for type, condition and compliance. Unique considerations for each type of component are outlined below. Where tested, the

specific functions to be identified, along with unique reporting considerations, are contained in the subsections below. As a general rule, report descriptions shall include the manufacturer and model, location of installation, the integrity of components and their installations, and operational status if tested. Systems tested during sea trial will require cooperation between the surveyor and the vessel operator, to ensure conditions are safe for the operator to demonstrate functions, and to make sure the surveyor's requests are not a distraction for the operator while attempting to navigate in and out of marina/docking situations, or in areas of limited navigation options or heavy vessel traffic.

9.1.1 GPS/Plotters

Global positioning system displays, chart plotters and Loran units, where tested, shall be inspected for full operation, including GPS fix, heading, chart, depth and radar overlay functions, network connections, and integrity of power supplies.

9.1.2 Depth/Speed/Temperature Units

Stand alone or multi-function displays, where tested, shall be inspected for full operation including transducers and network connections.

9.1.4 Autopilot Systems

Autopilot systems have multiple components that make the system work, and many of the components are located in different locations of the vessel. Displays, control units, actuators, hydraulic pumps, rudder indicators, electronic fluxgate compasses, and network connections shall all be inspected as part of the system. If tested, heading, rudder position and engagement/disengagement of autopilot controls can and should be evaluated during sea trial. When testing engagement, sufficient time sufficient time is required to ensure the system will hold a course and respond to course deviation inputs appropriately. The surveyor shall monitor autopilot operation carefully during this process. Sudden deviations in course not initiated by the operator may be an indication of problems with the functionality or set-up of the system.

9.1.5 Radar Systems

Displays and overlays, where tested, shall be inspected for full operation, including confirmation of scanner performance, dedicated and network connections. Where radar data is displayed on a plotter, or multi-function display, radar functions shall be confirmed on each display.

9.1.6 Wind Speed/Direction Instruments

Displays, where tested, shall be inspected for full operation, including wind speed and wind direction, and operation of transducers. Access to inspect wind transducers installed at mastheads may be limited.

9.1.7 Radios and Loudhailers

VHF, UHF, and Single Side Band radios and hailers, if tested, shall be inspected for basic operation, including power-up, channel selection, transmit and receive functions. Antennae, cables and connections shall be inspected for condition where accessible.

9.1.8 Automatic Identification Systems

AIS transceivers, if tested, shall be inspected for basic operation including network connections and data displayed regarding other nearby vessels.

9.1.9 Internal Vessel Communications

Intercom or phone systems local to the vessel for internal communications between areas of the vessel, if tested, shall be inspected for basic operation. If the surveyor is alone onboard the vessel, it may not be possible to properly test both ends of the communication device.

9.2 Computers and Networks

Computers and networks shall be inspected for type and condition. As a general rule, report descriptions shall include the manufacturer and model, location of installation, the integrity of components and their installations, and operational status if tested. Various configurations exist, including NMEA-compliant cable networks (NMEA 0183 and NMEA 2000), wired and wireless ethernet networks, and proprietary networks for electronically controlled onboard systems. Surveyors are not expected to thoroughly test operation of advanced networks such as ethernet and proprietary systems. It should be noted that Raymarine Sea Talk systems are not considered proprietary, as they have been designed to use the same communication language as NMEA 0183 and NMEA 2000 networks. Computer-based or ethernet-based navigation applications, if tested, should have all relevant functions demonstrated by the vessel operator prior to, following or, (where safe to do so) during, sea trial.

9.2.1 Computers

Computers should be identified as to purpose, particularly if they are employed to run navigation programs. Surveyors are not expected to test computers that are not intended to run vessel navigation software or other critical vessel operations.

9.2.2 Ethernet Networks

Wireless or cable ethernet systems may be LAN only, or they may be connected to the internet via satellite or another nearby wi-fi network. Surveyors are not expected to test network operation as part of a C&V survey inspection.

9.2.3 NMEA Networks

National Marine Electronics Association networks, including NMEA 0183, NMEA 2000, and NMEA One Net, are cable networks that use a common language to permit communication between different navigation electronics components, allowing intermingling of different component brands on a vessel. The standards promulgated by NMEA dictate language requirements and priorities for components connected to NMEA networks. Individual wires in the cables are of small size and subject to vibration damage if not properly secured to the vessel. This applies to long runs of unsupported cables and unsecured backbone/connection/terminations. Long term, vibration damaged cables and connections can negatively affect network reliability.

9.2.4 Security Systems

Vessels equipped with security systems may have various sensors fitted, along with control units. Electrical and electronic components installed in gasoline engine or fuel tank spaces shall be confirmed as ignition protected. Surveyors are not expected to test security systems for operation as part of a C&V survey inspection. If security systems are to be tested, manufacturers' instructions shall be followed carefully.

9.2.5 Video

Video cameras and display systems can be easy for a surveyor to miss. The surveyor should identify all cameras fitted to the vessel interior and exterior, along with displays fitted, or if the video feed is shown on a multi-function display. If tested, each camera shall be confirmed as operational. Components installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected.

9.3 Entertainment Systems

Video and audio systems installed for entertainment purposes, including televisions, satellite domes, antenna, receivers, video and audio tape players, video and audio disc players, multi-media players, amplifiers, disc changers, speakers, subwoofers, and soundbars shall be inspected for type and condition. While these systems are not considered essential for safe vessel operation, they may be tested as part of a purchase survey. Components installed in gasoline engine or fuel tank spaces shall be confirmed as ignition protected. Power supply wiring shall be inspected for compliance with applicable AC or DC electrical wiring requirements of applicable construction standards and regulations. Report descriptions shall include component manufacturers and models, locations of installations, integrity of components and installations, and operational status if tested.

PART 10: SAFETY SYSTEMS AND EQUIPMENT

10.1 Exterior Lighting

Lights shall be inspected for type, condition and compliance. If tested, lights shall be operated from all available switches, and each fixture shall be visually inspected for proper operation. Fixtures shall be inspected for damage and deterioration. Lighting control units installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. As a general rule, report descriptions shall include the type and location of fixture installations, integrity of components and their installations, and operational status if tested.

10.1.1 Emergency Lighting

Emergency lighting may be fitted with self-contained internal battery packs as an emergency power source. If power is available, emergency lighting shall be tested to confirm operation. In some cases, testing may require removal of an external power source to activate the battery back-up.

10.1.2 Docking Lights

If power is available, docking lights shall be tested for operation. Care should be exercised to inspect the fixtures for water intrusion/fogging of lenses. The perimeter of fixtures should also be inspected for intact sealant, as these installations can be a source of water intrusion.

10.1.3 Spot/Search Lights

Lights shall be tested for operation if power is available. For fixed installations, testing shall be conducted from all control switches and shall include illumination, rotation and up/down functions. Care should be taken to inspect the fixtures for damage or deterioration.

10.1.4 Courtesy Lights

Exterior courtesy lights, including lights in enclosed cockpits and bridge decks, shall be tested if power is available. Care should be taken to inspect the fixtures for damage or deterioration.

10.1.5 Deck Lights

Deck lighting may be affixed to any part of the superstructure, or to the mast or spreaders. Deck lights shall be tested if power is available.

10.1.6 Underwater Lights

The surveyor shall inspect underwater light fixtures carefully for water intrusion or fog in the lenses, and particular attention shall be given to the integrity of the installation. Electrical components installed inside a gasoline engine or fuel tank space shall be confirmed as ignition protected.

10.2 Life Saving Appliances

10.2.1 Emergency Escape Breathing Devices

EEBD devices shall be inspected for condition. The stowage location of these devices should be clearly labeled on the vessel if they are to be accessible and of value in an emergency. Report descriptions shall include the manufacturer, expiry dates, location of installation or stowage, and the integrity of the devices and their installations.

10.2.2 Automated External Defibrillators

AEDs shall be inspected for condition. AEDs should be stowed in a cabinet to protect the unit from damage and weather. Battery state of charge should be maintained and periodic inspections by a qualified technician should be undertaken on a schedule recommended by the manufacturer. AEDs are not tested as part of a C&V survey. Report descriptions shall include the number, manufacturer, serial number (if accessible), location of installation, and the integrity of the unit and its installation.

10.2.3 Person Overboard Recovery Devices

Buoyant heaving lines, life slings, lifebuoys, life rings, and other MOB devices shall be inspected for type, condition, and compliance. Report descriptions shall include the number, type, location of installations, and the integrity of the devices and their installations.

10.2.4 Reboarding Ladders and Gangways

Ladders, ramps, and gangways intended for embarking, disembarking and reboarding from the water shall be inspected for type, condition and compliance. Electrically operated ramps and gangways shall be tested throughout their full range of operation if power is available, and if the conditions of the location of inspection permit safe extension and retraction. Electrical components installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. Re-boarding ladders shall be deployed if safe and practical to do so. The surveyor should be aware of any obstructions or conditions that may prevent the ladder from being deployed from the water. Care shall be taken to inspect mounting fasteners and the condition of the structure to which the ladder is fastened. Report descriptions shall include the type and location of installations, the integrity of the components and their installations, and operational status if tested.

10.2.5 Life Rafts

Life rafts shall be inspected for type, condition and compliance. Protective cases shall not be opened by a surveyor. Care shall be taken to inspect for damage, deterioration. Report descriptions shall include the number, manufacturer, type, and locations of installations, expiry dates and the presence of hydrostatic releases, and the integrity of components and their installations.

10.2.6 Personal Flotation Devices

As the number of PFDs required on a vessel depends on the number of occupants on any given trip, there is no specific number that a surveyor is looking for, in most cases. As a general rule of thumb, the surveyor should expect to see at least the same number of PFDs as the vessel is rated to carry, as shown on the capacity label (if fitted). Regardless, PFDs present during a C&V survey inspection shall be inspected for

type and condition. Report descriptions shall include the types and locations of stowage, and whether an inventory was performed.

10.2.7 Emergency Hatches

Hatches of sufficient size to be used as a secondary means of egress in an emergency shall be inspected for condition and compliance. Careful attention shall be paid to the condition of hatch lenses, seals, closures, and supports. Report descriptions shall include the number and locations of emergency hatches, and the integrity of components and their installations.

10.3 Visual Distress Signals

10.3.1 Emergency Position Indicating Radio Beacons

EPIRB devices shall be inspected for condition. Surveyors are not required to test EPIRB devices as part of a C&V survey inspection. Report descriptions shall include the manufacturer, number and locations of installations, expiry dates, and the integrity of devices and their installations.

10.3.2 Pyrotechnic Distress Signals

Flares shall be inspected for type, condition and compliance. Surveyors shall recommend removal and proper disposal of expired flares, as the expired internal flammable materials can become unstable over time. Report descriptions shall include the number, type, expiry, and locations of stowage, along with the integrity of the flares and associated launching devices.

10.3.3 Electronic Distress Beacons

Electronic flares shall be inspected for type, condition and compliance. Beacons shall be tested for proper operation. Report descriptions shall include the number, type, manufacturer and locations of installations or stowage, along with the integrity of components and their installations, and operational status if tested.

10.3.4 Watertight Flashlights

Flashlights shall be inspected for type, condition and compliance. Flashlights shall be tested for proper operation. Report descriptions shall include the number, type, and locations of stowage, along with the integrity of components and operational status if tested.

10.4 Vessel Safety Equipment

10.4.1 Ground Tackle

Anchors and rode shall be inspected for type, condition and compliance. Surveyors are not expected to run out the full length of chain or rope as part of a C&V survey, as space and conditions are often limiting factors. Care should be taken to identify secondary and tertiary anchoring systems that may be stowed in hard-to-reach areas of the vessel. Anchor shackles and related fastening should have mousings fitted. Report descriptions shall include the type and locations of installations of anchors and rode, along with the integrity of components and their installations.

10.4.2 Windlass Installations

Windlasses shall be inspected for type, condition and compliance. Where power is available and where conditions permit safe testing, windlasses shall be tested for basic operation in both directions. Often, testing may be limited to brief powering up of the windlass from each control switch installation. Testing of hydraulic windlass installations may not be possible with the vessel hauled, particularly if hydraulic power is sourced from an engine power take-off. Electric windlasses shall be inspected carefully for

compliant connections (particularly unsecured wiring harnesses in forepeak lockers that may be prone to entanglement with rode), and deterioration from corrosion. Report descriptions shall include the type, manufacturer, model, voltage specifications (for electric type windlasses), integrity of components and installations, and operational status if tested.

10.4.3 Fenders and Mooring Lines

Fenders and lines shall be inspected for condition. Report descriptions shall include the type and locations of installations, along with the integrity of components. An exhaustive inventory is not required as part of a C&V survey.

10.4.4 Boat Hooks

Boat hooks shall be inspected for type and condition. Report descriptions shall include the type (construction materials), number and location of installation or stowage, and the integrity of components.

10.4.5 Paddles

Paddles and other manual propelling devices shall be inspected for type, condition and compliance. Report descriptions shall include the number, type, locations of stowage, and the integrity of the device.

10.4.6 Bilge Pumps

Bilge pumps shall be inspected for type, condition and compliance. Where power and standing bilge water is present, pumps shall be tested for dynamic operation. Where insufficient bilge water is present, pumps shall be tested statically only (powered up briefly to confirm audible pump operation). Power operated bilge pumps shall not be run dry for an extended period, in order to prevent damage. Float switches shall be tested, along with operation from all manual switch locations. Pumps and float switches installed in a gasoline engine or fuel tank space shall be confirmed as ignition protected. For installations where bilge pumps serve multiple functions onboard a vessel, and where a procedure needs to be followed to convert the pump and manifold for bilge pump testing, the surveyor is not expected to test that specific bilge pump system, unless a qualified operator is present to demonstrate system operation. Report descriptions shall include the type, manufacturers, voltage and rated flow capacity, the presence of float switches, the integrity of components and their installations, and operational status if tested.

10.4.7 Bailers

Bailing buckets shall be inspected for type, condition and compliance. Report descriptions shall include the number and type, locations of stowage, and the integrity of the bailers.

10.4.8 First Aid Kits

First aid kits shall be inspected for type, condition and compliance. Report descriptions shall include the number and locations of stowage, along with the integrity of kits and contents.

10.5 Navigation Equipment

10.5.1 Sound Signals

Horns, sirens, bells and manual sound signalling devices shall be inspected for type, condition and compliance. Where power is available, electric and compressor-driven air type horns shall be tested for proper operation. Manual sound signals (including handheld air horns) shall be tested for operation, providing suitable outdoor conditions are available at the time of inspection. Report descriptions shall include the number, type, locations of installations or stowage, integrity of components and their installations, and operational status if tested.

10.5.2 Radar Reflectors

Radar reflectors shall be inspected for type and condition. The surveyor should keep in mind that installation on small vessels may be impractical. Report descriptions shall include the type, location of installation, and the integrity of components and their installation.

10.5.3 Navigation Lights

Lights shall be inspected for type, condition and compliance. Where power is available, navigation lights shall be tested for proper operation. Care should be taken to inspect for the presence of photocells fitted to navigation light circuits, as such configurations will affect daylight testing. Report descriptions shall include the type, locations of installations, integrity of components and their installations, and operational status if tested.

10.5.4 Magnetic Compass

Compasses shall be inspected for type, condition and compliance. Electronic compass installations shall be powered up if power is available. Full operation shall be tested if a sea trial is conducted. Report descriptions shall include the type, manufacturer, model, location of installation, integrity of components and installations, and operational status if tested.

10.6 Firefighting Equipment

10.6.1 Fixed Fire Extinguishing Systems

FFE systems shall be inspected for type, condition and compliance. Care should be taken to identify discharged cylinders. FFE systems cannot be fully tested without discharging of the system, however, remote monitors shall be powered up if power is available, and the system status (normal/override) noted. Manual discharge handles shall be inspected to ensure the safety pin is in place. Expired systems with halon variations shall be flagged for upgrade. Report descriptions shall include the number of cylinders, manufacturer, type, details (including location) of installations, integrity of system components and installations, state of charge, date of most recent certification, and operational status if powered up.

10.6.2 Fire Ports

Fire ports shall be inspected for location, condition and compliance. The surveyor shall take care to identify all fire ports present (including those installed to generator enclosures), and any gear stowage or component installations blocking access. Further, the surveyor shall be prepared to comment on the suitability of onboard portable fire extinguishers for use with the fire ports fitted. For example, portable fire extinguishers fitted to the vessel that have insufficient hose length to reach the fire port opening. Such a condition renders the fire port unserviceable. Report descriptions shall include the number and location of installations of fire ports, and the integrity of the installations.

10.6.3 Portable Fire Extinguishers

PFEs shall be inspected for type, condition and compliance. Report descriptions shall include the number, type, manufacturer, serial number, location of installation, state of charge, date of manufacture, date of most recent certification, and the integrity of components and installation for each PFE found onboard.

10.6.4 Fire Pumps

Fire pumps shall be inspected for type, condition and compliance. For installations where fire pumps serve multiple functions onboard a vessel, and where a procedure needs to be followed to convert the pump and manifold for fire pump testing, the surveyor is not expected to test the fire pump system, unless

a qualified operator is present to demonstrate system operation. Otherwise, fire pumps shall be tested for operation where systems are commissioned and inspection conditions permit (vessel afloat, engines running during sea trial). Report descriptions shall include the type, location of installation, system description, integrity of components and their installations, and operational status if tested.

10.6.5 Fire Buckets

Fire Buckets shall be inspected for type, condition and compliance. Report descriptions shall include the type, locations of stowage or installations, and the integrity of the fire buckets and related installation components.

10.6.6 Fire Axes

Axes shall be inspected for condition and compliance. Report descriptions shall include the number and locations of installations or stowage, the integrity of axes and their installations.

10.6.7 Fire Blankets

Fire blankets shall be inspected for condition. Report descriptions shall include the number and locations of stowage, and the integrity/condition of the fire blankets found onboard.

10.6.8 Self-Contained Breathing Apparatus

SCBA units shall be inspected for type and condition. Tanks shall be inspected for state of charge and recertification status. The surveyor is not required to test SCBA units found onboard. Report descriptions shall include the number, manufacturer, location of installation or stowage, and the state of charge of cylinders, integrity of SCBA units and their installations.

10.7 Detectors and Alarms

Detectors shall be inspected for type, condition and compliance. Where power is available, detectors shall be tested using the built-in test functions.

10.7.1 Smoke and Carbon Monoxide Detectors

Detectors have a limited lifespan and the expiry dates shall be noted. Report descriptions shall include the type, number of detectors, installation locations, integrity of components and their installations, and operational status if tested.

10.7.2 Gasoline Fume Detectors

Many gasoline fume detectors installed on older vessels are original. It may not be possible for the surveyor to determine if the sensor is working properly. Surveyors should consider recommending replacement of gasoline fume detectors that appear to be aged. Report descriptions shall include the manufacturer, location of installations, the integrity of components and their installations, and operational status if tested.

10.7.3 LPG (Propane) Fume Detectors

Propane detectors with an automatic shut-off function will require the surveyor to confirm loss of fuel supply to a nearby appliance when tested. These detectors require careful consideration of installation location and should require a reach across the galley range or other cooktop to activate. Report descriptions shall include the manufacturer and model, location of installation, the integrity of components and their installations, and operational status if tested.

10.7.4 Engine Warning System Alarms

Engine warning alarm systems shall be tested with ignition 'key on' power where power is available. This test is performed without the engine running. With the key in the run position (not started) for several seconds, the alarm should activate. This test confirms only that the low oil pressure function is working. It is impractical to test other alarm functions as part of a C&V survey inspection.

10.7.5 High Water Alarms

High water alarms shall be inspected for type, condition and compliance. High water sensor/float switch operations shall be tested where power is available. Sensors and float switches installed in gasoline engine or fuel tank spaces shall be confirmed as ignition protected. Report descriptions shall include the number, type and location of components, integrity of components and their installations, and operational status if tested.

PART 11: ADDITIONAL EQUIPMENT

11.1 Davits/Deck Crane Systems

Davits/deck crane systems shall be inspected for type, condition and compliance. Extra care shall be exercised by the surveyor to identify damage, deterioration, integrity of fastenings, and any indicators of stress-related deterioration of structures to which the davits system is mounted. Hydraulically or electrically operated systems shall be run through the full operating range if tested. Hydraulic components and fittings shall be observed for leaks during and after testing. Commercial deck cranes should be inspected for the presence of an engineering label identifying safe working load. Electrical components installed in gasoline engine or fuel tank spaces shall be confirmed as ignition protected. The surveyor shall also observe whether the davits system is sufficient in designed capacity for intended use. Report descriptions shall include type and system description, manufacturer, location of installation, integrity of components and their installations, and operational status if tested.

11.2 Tenders (Dinghies)

The surveyor is not required to conduct extensive testing of tenders. The surveyor can briefly inspect a dinghy for valuation purposes but should avoid statements certifying condition or suitability for intended use. For the purpose of this code of practice, the tender is considered a separate vessel. If the client wishes to retain the surveyor to conduct a survey of a tender, dinghy or emergency boat, the surveyor should make such arrangements separately and should, in all cases, clearly identify the scope of work. Report descriptions shall include the type, manufacturer, model, model year, HIN, capacity, and length overall.

11.3 Trailers

The surveyor is not required to conduct extensive inspection of trailers. The surveyor can briefly inspect a trailer for valuation purposes, but should avoid statements certifying condition or suitability for intended use. Report descriptions shall include the type, frame construction material, manufacturer, model, model year, VIN, capacity, and number of axles.

11.4 Cradles

The surveyor is not required to conduct extensive inspection of cradles. The surveyor can briefly inspect a cradle for overall presentation and for valuation purposes but should avoid statements certifying

condition or suitability for intended use. Report descriptions shall include the type, frame construction materials and rated capacity (if available).

11.5 Non-Fixed Furnishings

Any furnishings found onboard that do not form a permanently attached fixture of the vessel shall be identified in this section. Insurers will use this information to help establish any additional value. Report descriptions shall include a basic description of the type of furniture, the number of pieces and the finishing materials. Inclusion of pictures in this section is helpful to the boater in cases of an insurable loss.

PART 12: SUMMARY STATEMENTS

C&V reports shall contain a summary statement that provides an overview of vessel condition, and shall clearly identify any safety and regulatory repairs the surveyor is recommending. Repair priorities shall, as much as possible, avoid opinion statements. Wherever possible, statements shall be supported by reference to applicable regulations and construction standards (either within the summary statement or in the body of the report). In cases where specific regulatory or construction standards references cannot be applied, surveyors shall use the descriptions and wording contained this code of practice to ensure consistency of reporting practices.

When making a statement of vessel condition, the surveyor shall use terms such as ‘satisfactory for intended use’ or ‘unsatisfactory for intended use’. If the vessel is deemed to unsatisfactory, a brief explanation of the reasoning for the surveyor’s opinion shall be provided. Highly subjective terms, such as ‘average’ or ‘above average’ shall be avoided. Every surveyor will have a different opinion of what condition supports a description of ‘average’, and with aging fleets in many parts of the country, ‘average’ condition becomes poorer over time. Vessel condition statements should not be confused with terminology promulgated by valuation subscription services.

PART 13: VALUATION

Vessels shall be assigned a fair market value and estimated replacement value based on Uniform Standards of Professional Appraisal Practice (USPAP), and shall include examples of current listings, Sold Boat subscription history and BUC subscription values. Comparable vessel calculations shall be based on the same or similar make, model and model year of vessels. As a general rule, the larger the sample size, the more accurate the value ranges. Extreme values, such as obviously inflated asking prices or salvage pricing, should be eliminated from valuation calculations. Additional equipment including outboard motors, tenders, trailers, cradles, and non-fixed furnishings shall be shown separately with individual appraisal value ranges. Fair market value shall be expressed as a range of values not exceeding a 10% variance. A statement shall be included that taxes are excluded from value ranges. Currency type shall be shown in the valuation. Currency may be customized to the client’s preference, but Canadian dollars (CAD) shall be the default currency.

APPENDIX A: REFERENCE TABLES

Table 4-1: Flir MR160/MR176 Moisture Meter Values Interpretation

Range of values (scale 0-100)	Interpretive Description
0-20	Dry
21-35	Slightly Elevated
36-50	Moderately Elevated
51-100	Significantly elevated

Return to Section 4.7.1 Interpretation of Relative Moisture Readings

Table 5-1: Structural Condition Categories

Category Number	Category Description	Definition
0	Intact and Serviceable (no deficiency sighted)	Visually intact and undamaged, suitable for intended use
1	Monitor and re-evaluate condition annually for progression	Material may be showing early indications of deterioration, but no immediate action is required
2	Further Investigation Recommended	Indications of progressed or progressing deterioration present, but without immediate structural implications
3	Immediate Repair Recommended	Indications of progressed structural deterioration with structural implications

Return to Section 5.1 Hull, Decks, Superstructure, Platforms

Table 5-2: Hull Soundings Matrix

Location	Maximum Spacing of Soundings (both axes)
Hull bottom, topsides and transom – exterior and accessible interior spans (clear spans uninterrupted by penetrations)	10cm (4”)
Spans within a 30cm (12”) radius of a penetration below the waterline	2.5cm (1”)
Spans within a 30cm (12”) radius of a penetration above the waterline	5cm (2”)

(Table continued on next page)

Location	Maximum Spacing of Soundings (both axes)
Spans within a 30cm (12”) radius of an area showing elevated relative moisture readings (except metal or carbon fibre substrates), above or below the waterline	5cm (2”)
Spans within a 30cm (12”) radius of an area showing suspect soundings, above or below the waterline	2.5cm (1”)
Spans within a 30cm (12”) radius of a displaced or non-displaced visible disturbance in the finish	2.5cm (1”)

Return to Section 5.1.2.2 Hull Soundings

Table 5-3: Hull and Deck Framing Soundings Matrix

Where the span is large enough to support conducting soundings in a grid pattern, use the grid spacing column in the table below. Where a span is very narrow or presents with a very small surface area, such as with some cross-frames the linear spacing column should be referenced.

Location	Grid Spacing (both axes)	Linear Spacing
Hull framing and bulkhead spans immediately surrounding bilges, in holds, or in spaces where bilge water is likely to accumulate	10cm (4”)	10cm (4”)
Hull, deck and superstructure framing along with bulkhead spans above normal accumulation of bilge water or above the sole of the lowest deck or accommodation space	20cm (8”)	10cm (4”)
Spans within a 30cm (12”) radius of an area showing elevated relative moisture readings (except metal or carbon fibre substrates)	5cm (2”)	5cm (2”)
Spans within a 30cm (12”) radius of an area showing suspect soundings	2.5cm (1”)	2.5cm (1”)
Spans within a 30cm (12”) radius of a displaced or non-displaced visible irregularity in the finish	2.5cm (1”)	2.5cm (1”)

Return to Section 5.1.4 Hull and Deck Framing Inspection

Table 5-4: Decks and Superstructure Soundings Matrix

Location	Maximum Spacing of Soundings (both axes)
All exterior and accessible interior spans (clear spans uninterrupted by penetrations)	20cm (8”)
Spans within a 30cm (12”) radius of a penetration in the substrate	10cm (4”)
Spans within a 30cm (12”) radius of an area showing elevated relative moisture readings (except metal or carbon fibre substrates), above or below the waterline	5cm (2”)
Spans within a 30cm (12”) radius of an area showing suspect soundings	5cm (2”)
Spans within a 30cm (12”) radius of a displaced or non-displaced visible disturbance in the finish	5cm (2”)

Return to Section 5.1.5 Decks and Superstructure Inspection

Table 5-5: Establishing the Degree of Deterioration of Composite Structures

Presenting Condition	Category
No deterioration – laminate appears intact and undamaged with bright soundings	0
Early deterioration – Any of the following findings: • Irregularities (Non-displaced cracks or chips, discolouration or roughness) in the gelcoat or paint finish with bright soundings • Non-structural blisters visible in the gelcoat or paint finish • Slightly dull soundings	1
Progressed deterioration *without structural implications* – Any of the following findings: • Displaced cracks in the gelcoat or paint finish, with or without involvement of the substrate • Dull soundings, but no visible flexing of laminate span with external pressure	2

(Table continued on next page)

Presenting Condition	Category
Progressed deterioration *with structural implications* – Any combination of two or more of the following findings: • Displaced cracks, gaps, holes or openings in the gelcoat or paint finish, with involvement of the substrate • Dull soundings, with or without visible flexing of laminate span with external pressure • Corresponding elevated moisture readings in an associated span (except carbon fibre laminates) • Visible distortion of the laminate in an area intended to be fair • Visible flexing of laminate with external pressure • Exposed core material readily flakes during probing, or probe can be easily inserted into wood core	3

Return to Section 5.2 Composite Hulls, Decks and Superstructures

Table 5-6: Establishing the Degree of Deterioration of Metal Structures

Presenting Condition	Category
No deterioration – span appears intact and undamaged, and bright soundings	0
Early deterioration – Any of the following findings: • Irregularities (Non-displaced cracks or chips in the finish coatings with visible corrosion staining in or around the area of exposed substrate, deformation of plating without weld or fastener failure, and without visible separation of plating, and with bright soundings • Isolated weld or fastener failures (excluding external welds or fasteners at hull plating) measuring no more than 5cm (2”) in length • Isolated separation of any internal framing from hull or deck plating not exceeding 5cm (2”) in length • Failure of protective coating with or without visible surface corrosion • Slightly dull soundings without visible flexing of the plating with external pressure • Surface corrosion without visible material loss • UT values showing less than 95% of nominal plating thickness	1

(Table continued on next page)

Presenting Condition	Category
Progressed deterioration *without structural implications* – Any of the following findings: • Displaced cracks, gaps, holes or openings in protective coating, with involvement of the substrate • Dull soundings, but no visible flexing of plating with external pressure • Isolated separation of any internal framing from hull or deck plating greater than 5cm (2”) but not exceeding 15cm (6”) in length • Visible flexing of *steel* plating with external pressure but without evidence of weld (or fastener) failure or separation • Isolated weld or fastener failures (excluding external welds at hull plating) measuring greater than 5cm (2”) but no more than 15cm (6”) in length • Corrosion with material loss *without* visible distortion of the shape of surface of the substrate, and with or without accompanying UT values • UT values showing less than 90% of nominal plating thickness	2
Progressed deterioration *with structural implications* – Any of the following findings: • Displaced cracks, gaps, holes or openings in protective coating, with involvement of the substrate • Dull soundings, with or without visible flexing of the span with external pressure • Weld or fastener failures larger than 15cm (6”) in length, or any external hull weld or fastener failure below the sheer • Separation of any internal framing from hull or deck plating exceeding 15cm (6”) in length • Failure of plating or framing due to progressed corrosion or damage • Corrosion with material loss resulting in visible distortion of the shape of surface of the substrate, and with or without accompanying UT values • UT values showing less than 85% of nominal plating thickness	3

Return to Section 5.3 Metal Hulls, Decks and Superstructures

Table 5-7: Establishing the Degree of Deterioration of Wood Structures

Presenting Condition	Category
No deterioration – wood appears intact and undamaged, and normal wood colour, and bright soundings, and solid material during probing	0
Early deterioration – Any of the following findings: • Discolouration of wood (often dark) • Slightly dull soundings with or without elevated relative moisture readings • Surface of wood appears soft during probing but probe not easily inserted deeper into wood fibres (wood remains solid)	1
Progressed deterioration *without structural implications* – Any of the following findings: • Increased coarseness or very dark appearance of wood • Dull soundings but no visible flexing of wood with external pressure • Surface of wood readily flakes during probing, or probe can be easily inserted into wood • Any of the above findings with or without elevated relative moisture readings	2
Progressed deterioration *with structural implications* – Any combination of two or more of the following findings: • Increased coarseness or very dark appearance of wood • Visible material loss from the surface of the wood • Dull soundings • Visible flexing of wood with external pressure • Surface of wood readily flakes during probing, or probe can be easily inserted into wood	3

Return to Section 5.4.1 Wood Structures

Table 5-8: Establishing the Degree of Deterioration in Less Common Materials

Presenting Condition	Category
No deterioration – span appears intact and undamaged, and bright soundings	0
Early deterioration – Any of the following findings: • Irregularities (Non-displaced cracks or chips in the finish coatings with visible corrosion staining in or around the area of exposed substrate, deformation of substrate without bonding or fastener failure, and without visible separation of spans, and with bright soundings • Isolated bonding or fastener failures (excluding external binding or fasteners at hull plating) measuring no more than 5cm (2”) in length • Isolated separation of any internal framing from hull or deck substrates not exceeding 5cm (2”) in length • Failure of protective coating with or without visible surface corrosion • Slightly dull soundings without visible flexing of the substrate with external pressure • Surface corrosion without visible material loss	1
Progressed deterioration *without structural implications* – Any of the following findings: • Displaced cracks, gaps, holes or openings in protective coating, with involvement of the substrate • Dull soundings, but no visible flexing of the substrate with external pressure • Isolated separation of any internal framing from hull or deck substrates greater than 5cm (2”) but not exceeding 15cm (6”) in length • Visible flexing of substrate with external pressure but without evidence of weld failure or separation • Isolated binding or fasteners failures (excluding external binding or fasteners at hull substrate) measuring greater than 5cm (2”) but no more than 15cm (6”) in length • Corrosion with material loss *without* visible distortion of the shape of surface of the substrate	2
Progressed deterioration *with structural implications* – Any of the following findings: • Displaced cracks, gaps, holes or openings in protective coating, with involvement of the substrate • Dull soundings, with or without visible flexing of the span with external pressure • Bonding or fastener failures larger than 15cm (6”) in length, or any external hull bonding or fastener failure below the sheer • Separation of any internal framing from hull or deck substrates exceeding 15cm (6”) in length • Failure of plating or framing due to progressed corrosion or damage • Corrosion with material loss resulting in visible distortion of the shape of surface of the substrate	3

Return to Section 5.4.2 Ferro-Cement Structures