Australian Government
Australian Maritime Safety Authority

Domestic Commercial Vessel
INSTRUCTIONS TO SURVEYORS

DCV-ITS-022 (7/2024)

Subject: The inspection of foam buoyancy, hull voids and fuel tank compartments at 10 yearly surveys of Domestic Commercial Vessels (DCV) as required by the *Surveyor Accreditation Guidance Manual (SAGM) 2014 Part 2 Section 4.11 (2)(d) & (e).*

Scope: This Instruction to Surveyors (ITS) is applicable to vessels with sealed underdeck chambers that are foam filled such that a breach of the watertight envelope does not lead to complete flooding of the space and ultimate loss of the vessel. Risk is controlled through the inclusion of buoyancy foam such that full inspection need not be required.

Notes:

- Vessels using air chambers, as permitted in NSCV C6B, present a higher risk as breach of an air chamber could lead to vessel flooding. These vessels are not included in this ITS.
- This ITS does not cover the internal inspection of fuel tanks and their associated components.

General:

This Instruction to Surveyors (ITS) sets out methods for inspection of foam buoyancy, hull voids and fuel tank compartments, as required for a 10 yearly renewal survey in the *Surveyor Accreditation Guidance Manual (SAGM) 2014 Part 2 Section 4.11 (2)(d) & (e).* The requirement for hull/foam to be inspectable is outlined in NSCV Part C6B, Clause 10.4.6.

SAGM Part 2 does not outline specific inspection methods for tank compartments, hull voids or buoyancy foam. Direct visual inspection may be used where under-deck areas are easily accessible. However, in cases where vessels have sealed decks or limited access, alternative means of inspection may be required.

This ITS provides a range of survey methods that may be applied by an Accredited Marine Surveyor (AMS) to satisfy the requirements of *SAGM Section 4.11 (2)*(d)&(e). The AMS may also use alternate nationally or internationally recognised methods such as class rules or IACS guidelines where they are better suited to a particular vessel. If, after performing a particular test or step, the AMS is not satisfied that the condition of the foam or structure has been adequately determined, they are to conduct further investigations as required including invasive inspections. The AMS is to use best practice and is ultimately responsible for verifying that the vessel continues to meet the applicable standards. Recommendations to the National Regulator need to be accompanied with technical justification of the approach taken to establish the condition of the items inspected.

Where an inspection hole is required to determine the condition of foam buoyancy and/or hull structure, it is suggested that the repair be affected by the installation of a watertight deck spin out where appropriate to facilitate future inspection.

Definition:

Age: the chronological age of the vessel hull measured from construction date.

AMS: Accredited Marine Surveyor

Fuel tank compartment: a liquid and vapour tight compartment into which a petrol fuel tank is installed, as described in NSCV Part C Section 5A Clause 4.10.5.

SAGM: the Surveyor Accreditation Guidance Manual 2014 Part 2

National Regulator: the Australian Maritime Safety Authority

Instruction: An AMS should select an inspection methodology giving consideration to:

- The age of the vessel;
- Build documentation
- The construction material of the vessel; and
- The type of foam installed.

Age	Construction Material	Foam type	Inspection method
Entering survey	Any	Any	Full inspection
10-25 years	Aluminium	LDFM	Option 1 Option 3
10-25 years	Composite	LDFM	Option 1 Option 3
10-25 years	Composite	Poured foam	Option 2 Option 3
10-25 years	Aluminium	Encapsulated pour foam	Option 4
25+ years	Composite	Any	Option 4
25+ years	Aluminium	Any	Option 4

Note:

1. *A vessel that has used option 3 and confirmed the internal hull arrangement and internal buoyancy material may use option 1 for the next 10-year renewal survey, only if internal buoyancy foam is replaced at the inspection. In other cases, the vessel is required to undergo option 3 at its subsequent inspection.*
2. *If evidence of external weld repairs on the hull (in way of the watertight boundaries) is found only option 3 valid.*

NOTE: DCV-ITS-021 for thickness measurements of metallic hulls may also apply. A vessel using options 1 or 2 of Table 2 must also undertake thickness measurements of inaccessible compartments.

Methodology: Each step is a separate test or inspection that can verify compliance. After completing a step, a surveyor may conclude that additional inspections are required or that the vessel is in satisfactory condition and no further inspection is warranted.

Option 1: Non-destructive

Step 1: Check for water ingress.

- **Drain Compartments:** Check for signs of fuel leakage and drain any excess water. If there's an unusual quantity of water ensure condensation, minor leaks from watertight closures, or any other source water is accounted for. Similarly for the presence of fuel.
  - Note: There must be a means of access to void spaces. If there is no means of access a suitable spin-out, bung or other access point must be installed.
- **Deck Fittings**: Inspect areas around fittings such as seats, davits, or other equipment for cracks or gaps that could lead to water leakage.
- **Deck/Side Shell Joints:** Examine the joints between the deck and side shell for any signs of separation or damage.
- If excess water or fuel is found move to step 2.

Step 2: Borescope inspection

- Confirm that adequate inspection can be affected, i.e. access for borescope to give meaningful results. This includes confirmation that the requirements of NSCV C6B 10.4.6. have been met, and foam is not resting on hull plating. If foam is found to be resting on the hull plating advanced inspection (step 3) must be undertaken.
- Conduct a borescope inspection of the internal sections of the hull, fuel tank compartment and accessible foam.
- Inspection to focus on areas most likely to suffer from degradation such as, the lower points of the space typically the aft section bottom plating.
- Inspect foam to extent possible and identify any signs of degradation, wear, or damage, looking for discoloration, cracks or unusual textures.
- Internal inspection is to include, to the surveyor's satisfaction, verification of foam integrity and survey of internal structure in high stress areas for cracks, signs of fatigue or other structural degradation.

Step 3: Advanced Inspection

- If NSCV C6B 10.4.6 compliance cannot be confirmed, or visible degradation is present, remove a section of the deck near the centreline towards the stern to inspect the bottom plate and keel.
- The cut-out should be at least 100 mm in diameter to facilitate inspection.
- Inspect foam to extent possible and identify any signs of degradation, wear, or damage, looking for discoloration, cracks or unusual textures.
- If foam or structure is compromised, Option 4 must be used.

Record Keeping:
The inspection is to be supported by the provision of all documentation relied upon, and a report detailing the inspections carried out including the presence of any water or fuel in the hull or fuel tank compartment(s). The method used to determine if water is present must be included, including the location and type of any inspection points installed.

Note: It is suggested that bungs, deck spin outs or other water-tight inspection ports are added to sealed spaces, this will assist in the detection of moisture or other degradation. These bungs can be added to the deck for inspection of underdeck spaces to prevent ingress from underwater openings.

Option 2: Pour foams and encapsulated pour foams

Step 1: Inspect Potential Ingress Points

- **Transom Bungs:** Check for signs of wear or damage that might allow water ingress.
- **Deck Fittings**: Inspect areas around fittings such as seats, davits, or other equipment for cracks or gaps that could lead to water leakage.
- **Deck/Side Shell Joints:** Examine the joints between the deck and side shell for any signs of separation or damage.
- **Check for Water:** Look for visible signs of water or moisture in the inspected areas. This may also be informed by weighbridge weight comparison, or by checking if the vessel is sitting low on its lines. This would indicate an increase in weight if it cannot be otherwise attributed to modification or vessel loading.
- If water ingress is suspected, proceed to step 2

Step 2: Remove Deck Section (if water ingress suspected)

- **Access the Foam:** If water ingress is suspected, remove a section of the deck to access and inspect the foam near suspected ingress points.
- **Inspect the Foam:** Examine the condition of the foam for signs of water absorption, discoloration, or degradation. If water absorption, discolouration, or degradation is found continue removing foam until the extent of the damage is known. If damage is near structural members move to step 3.

Step 3: Evaluate Local Structural Condition:

- Inspect structural members to determine if they have degraded e.g. timber stringers are rotten; foam or core material degraded.
- Determine extent of structural degradation.
- If significant damage or degradation is found, move to Option 4.

Record Keeping:
The inspection is to be supported by the provision of all documentation relied upon, and a report detailing the inspections carried out including the presence of any water or fuel in the hull or fuel tank compartments(s). The report will detail the vessel construction method, with particular note of stiffener material and condition.

Option 3: Lightship verification

If an accurate original lightship measurement report is available option 3 can be used as an additional assessment methodology to assess if foam materials have absorbed significant quantities of water.

The vessel is to undergo a lightship verification (as per SAGM Section 4.9). The vessel is to be weighed, using either freeboard measurement or direct weight measurement (using a weighbridge or loadcells). A lightship declaration cannot be accepted in lieu of a weight measurement for the purpose of this instruction. Direct weight comparison must be used. This is to detect the presence of water or fuel retained in the hull due to structural failure or degradation.

If water intrusion or fuel leakage has occurred into the foam the vessel weight will have increased. If an increase in weight greater than 4% has occurred further investigation should be undertaken, as per Options 1 & 2 above.

Note:

1. *NSCV Part C Section 6C Chapter 3 and Annex A provides the requirements for the conduct of a lightship check. For vessel opting to use Option 4 clauses 3.3.4 & 3.3.5 of Section 6C Chapter 3 are not applicable. Only direct measurement of the vessel lightship is permitted.*

Record Keeping:

The result of hull weight measurement is to include:

i. Confirmation of original vessel lightship; and,
i. A lightship comparison report (on AMSA 653 form or surveyors equivalent). The comparison report is to compare the vessel weight to the initial vessel lightship (i.e. the initial lightship derived from build); and
ii. Where a weighbridge is used for trailer boats a certificate for the combined vessel trailer and tow vehicle combination and the empty tow vehicle and trailer is to be provided.

Option 4: Visual examination

Remove fuel tanks and sections of the deck in sufficient size to permit the full inspection of flotation materials, structure and fuel tanks.

Record Keeping:

Results of internal inspection are to include:

i. Photos of internal hull voids and cofferdams showing the condition of the hull and internal structures; and,
ii. Records of type and location of any internal buoyancy material; and,
iii. Be provided to the vessel owner to permit the use of option 1 for further internal hull inspections.

Fuel Tank Compartments

Fuel tank compartments must be checked for water ingress. This may be achieved via sounding pipes installed in accordance with NSCV C5A 4.10.5 or via the tank compartment vent. Where sounding pipes have not been installed and other means of inspection have not been provided (eg. deck spin outs), the deck in-way-of the fuel tank compartment must be partially or entirely removed to enable inspection. If water or fuel is identified in the fuel tank compartment, the fuel tank must be removed for further inspection and rectification.

The risk of corrosion or other degradation to aluminium fuel tanks immersed in sea water requires that these are removed, if water or fuel is found in the fuel tank compartment. Break of the fuel tank in this way dramatically increases the risk of fire or explosion.

GRP vessels with polyethylene fuel tanks, or fuel tanks encapsulated with GRP, that have been set into the fuel tank compartment using pour-in foam may not have a fuel tank compartment vent. If deck-spinouts are installed to access the fuel sender and/or hose connections, the AMS must inspect the foam in these areas for fuel leaks. The internal surfaces of the fuel tank must be visually inspected via borescope and a pressure test undertaken. Where fuel leakage is identified or the condition of the tank is compromised, the tank must be removed for further inspection and rectification.

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Information to builders and plan approval surveyors:

This ITS highlights the need for design detail at the time of build to facilitate periodic inspection of fuel tank compartments, buoyancy foam and under-deck voids. The following items should be included in the design & construction of sealed deck vessels:

- Limber holes that permit drainage aft to transom bungs or to an inspection port located in the after end of the weather deck. This particularly relates to GRP vessels using poured foam. Where this may not be feasible, deck mounted inspection ports should be provided to facilitate inspection of each void.
- Poured foam must not be used in metallic hulls. Slab foam must be separated from the hull plating in accordance with NSCV C6B 10.4.6. to reduce corrosion risk. Correctly fitted foam buoyancy in metallic hulls dramatically reduces the likelihood of structural degradation.
- Means of sounding fuel tank compartments to be provided. This may be achieved via a designated sounding pipe; the fuel tank compartment vent; deck spin out; or via a drainage pipe led to a bung in the transom. These features also greatly improve the ability to maintain the fuel tank and associated components by facilitating the removal of condensation or other contaminates on a regular basis.
- Deck fittings should be mounted onto pads with fastenings that do not penetrate the weatherdeck.
- Weight measurements of completed hull in lightship state or known state which can be replicated should be taken following construction to allow for later comparison. This may avoid the need for destructive inspection in the future.