U.S. Coast Guard Sector Honolulu

Work Instruction 07

Certification of Rigid Hull Inflatable (RHI) Vessels

1. **References:**
   a. USCG Marine Safety Center Technical Note (MTN) 01-08, CH-2, Review of Rigid Hull Inflatable and Rigid Hull Foam Collar Vessels
   b. American Society for Testing and Materials (ASTM) Standard F1321 "Standard Guide for Conducting a Stability Test (Lightweight Survey and Inclining Experiment) to Determine the Lightship Displacement and Centers of Gravity of a Vessel
   c. Title 46 CFR Subchapter T – Small Passenger Vessels (under 100 Gross Tons)
   d. Title 46 CFR Subchapter S – Subdivision and Stability

2. **Objectives:** To provide guidance on the inspection and certification of rigid hull inflatable (RHI) vessels.

3. **Applicability:** Inspected small passenger RHI vessels operating within the Coast Guard Sector Honolulu marine inspection zone.

4. **Background:** Inflatable vessels have been certificated in Hawaii since 1984. The design and construction of inflatable vessels make them an open boat; however, inflatable vessels have been evaluated for their seagoing characteristics when on voyages not in excess of 5 miles from shore and have proven themselves in the service for which they have been certificated. Numerous inflatable vessels have been authorized routes in exposed waters throughout the Hawaiian Islands.

5. **Action:**
   a. Materials and Method of Construction:
      (1) Inflatable collars/main tubes should be fabricated from marine commercial grade polyurethane, polyvinyl chloride (PVC), rubber based or other suitable fabric of proven service coated on both sides to make them air tight and resilient in a marine environment. Depending on the material, the seams may be either glued or thermo-bonded. The material must meet or exceed the baseline/minimum properties listed in the Coast Guard Marine Safety Center's Marine Technical Note (MTN) 01-08.
      (2) Material used on cellular foam collars must be marine grade closed cell material that is tough, durable, resilient to abrasion and UV rays, impact resistant, as well as non-moisture and non-oil absorbent.
      (3) Inflatable collars can be subdivided into either an odd or an even compartmental arrangement. The minimum number of compartments is specified in MTN 01-08.
      (4) Floorboards or other similar arrangements provided must be removable to permit access to all interior areas of the hull in order to inspect collar-hull attachment points for signs of chafing and or abnormal wear.

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Chief, Inspections Division

b. Inspection of RHI Vessels:

(1) RHI's will be inspected in accordance with Subchapter T requirements during Certificate of Inspection (COI), annual, hull, and internal structural exam inspections. In addition, an exterior "leak" test must be conducted annually, using the procedures outlined below. During the vessel's scheduled drydock a overpressure "stress" test must be witnessed by the attending USCG marine inspectors following the exterior "leak" test. Credit drydock exams may be conducted concurrently with the annual exam when the vessel is hauled out for the exterior "leak" and overpressure "stress" tests. Prior to conducting the inspection, the manufacturer's recommended collar working/design pressure shall be established for each vessel within the Sector Honolulu marine inspection zone, and entered in the vessel details special notes section.

(2) At the beginning of each inspection, the vessel is to be hauled out and located in a well-shaded area, preferably inside a warehouse or garage. All USCG-required equipment shall be onboard or readily available for inspection. Prior to any collar test examination the following tools and materials shall be provided by the owner/operator: a calibrated pressure gauge, specifications with manufacturer's working and maximum allowable working pressures, soapy water solution, and the RHI owner's manual.

(3) Exterior "leak" test: This test is to be conducted annually. For existing vessels, the main collar is to be inflated to 1.25 times the manufacturer's suggested operating pressure with all inflation valve covers on and held for 30 minutes. During the 30 minute pressure test, the main collar shall be checked for signs of leakage, seam slippage, rupture or separation from the hull. At the end of the 30 minute test, the collar pressure at each inflation valve must not have decreased by more than five percent. If the pressure drops more than five percent, the cause must be determined by re-inflating the collar and applying a solution of soapy water to all seams and attachment points to identify any leaks in the form of bubbles, and by visually and audibly inspecting inflation and over pressurization valves and or by the manufacture's suggestions. For new vessels, newly fabricated collars, significantly repaired/"rebuilt" collars and when the collar integrity is in question by the attending marine inspector, the test will be completed by inflating to 1.5 times the working pressure and will be held for 1-hour.

(4) Overpressure "stress" test: This test is to be conducted concurrently with the scheduled credit drydock exam and if there are any failures noted during the annual Exterior "leak" test. Following the successful completion of the exterior "leak" test, an overpressure "stress" test will be conducted to determine the integrity of the interior compartmental baffles/bulkheads. As determined by the marine inspector, alternating compartments shall be deflated/inflated (every other compartment inflated), and all inflation valve covers on. For existing vessels, the inflated compartments shall be inflated to 1.25 times the working pressure and held for 15 minutes. In that time, the pressure must not have decreased by more than 5 percent. If the pressure drops more than 5 percent, determine cause by checking alternating compartments (deflated chambers) for an increase in pressure as measured from the beginning of the test or by physical rise in compartment shape, alternate deflation/inflation configuration and retest or examine valves for possible leaks. For

new vessels, newly fabricated collars, significantly repaired/"rebuilt" collars and when the collar integrity is in question by the attending marine inspector, the test will be completed at 1.5 times the working pressure.

(5) Any identified failures including the inflation valves and relief devices are considered a failure of the collar. A CG-835 and operational control will be applied until the collar can successfully pass the test. The attending marine inspector will notify the Sector Honolulu Chief of Inspections Division (CID) upon observing a failure to discuss the situation, any recommendations, and potential operational controls. The owner/operator shall make repairs in accordance with manufacturer's guidance and re-test in accordance with paragraphs (2) through (4) to ensure satisfactory completion of the test. Repairs to minor baffle leaks identified during the overpressure "stress" test may be deferred at the discretion of the CID so long as the leaks are not in association to more than one baffle per side. The determination will be based on the amount of pressure drop during the overpressure "stress" test, manufacturer's recommendations, the total number of baffles, the vessels route, and typical operating conditions.

(6) Fuel Tank Inspection: All fuel tanks are required to be made available for inspection during the credit drydock exam or at the discretion of the attending Marine Inspector for cause. This may necessitate the removal of floor boards in order to properly inspect the exterior of the fuel tank.

c. Additional Equipment Required:

(1) Hiking straps for foot holds or some form of internal passenger restraint, such as glued-on hand holds, are to be installed in addition to lifelines around the periphery of the tube for passenger safety.

(2) Vessels operating along the Na Pali coast in Kauai, regardless of the distance from the coastline, must have a Category I 406 MHz Emergency Position Indicating Radio Beacon (EPIRB) mounted in a float free arrangement.

(3) A suitable patch kit and air inflation pump is required to be carried on board.

(4) A VHF radio is required and an FCC Form 824 must be obtained from the Federal Communications Commission.

(5) Each RHI must be equipped with efficient means of pumping/draining water from the hull confines while at rest and when underway except when in compliance with swamped condition stability requirements in accordance with MTN 01-08, CH-2.

d. Fire Protection Equipment:

(1) New or existing vessels which meet the following parameters are not required to have a fixed fire extinguishing system in the fuel tank space:

(a) The fuel tank space can only contain the tank and associated piping. It shall be free from any ignition sources (e.g. wiring, junction boxes, switches, or any material which could become saturated and promote spontaneous combustion). The space shall not be capable of having articles stored in the space and shall not be adjacent to any other space containing internal combustion machinery.

(b) The vessel is a single open deck boat equipped with outboard engines only with passenger and crew accommodations directly above the fuel tank space to ensure that any smoke emanating from the space is readily apparent.

(2) One 40-B:C portable fire extinguisher will be required for vessels powered by outboard engines with portable fuel tanks.

e. Routes for U.S. and Foreign Built Hulls:

(1) The cabotage laws prohibit the transportation of merchandise or passengers between points in the United States included within the coastwise laws other than by a vessel built in, documented under the laws of, and owned by citizens of the United States. The Customs Service has ruled that the carriage of passengers entirely within the territorial waters, even if the passengers disembark at their point of embarkation and the vessel touches no other coastwise point, to be coastwise trade subject to coastwise laws.

(2) Foreign-built hulls are restricted to what is commonly referred to as "voyages to nowhere," i.e., the vessel must pick up passengers at one point, pass beyond the territorial sea boundary (3 miles offshore) at some point during its voyage, and return to its embarkation point to discharge passengers. Such a vessel may not anchor, fish, swim or disembark passengers at any place other than the point of origin.

(3) The cabotage laws are enforced by the U.S. Customs Service. Many operators of existing certificated inflatables have sufficiently modified or rebuilt hulls in the U.S. such that U.S. Customs has declared these vessels to be U.S. built in regards to the applicability of the coastwise laws. The process of obtaining this ruling involves a findings of fact determination made by the U.S. Customs Service Carrier Rulings Branch in Washington, D.C. on a request from a U.S. Citizen. A number of findings of fact rulings have been made and are on file in CID files. The initial ruling was issued on 1 March 1985 (VES-3-06/VES-3-23).

(4) If the vessel is determined to be of foreign build, the following route endorsement shall be placed on the COI:
"Vessel shall not operate on routes greater than 5 miles from shore. Vessel is not permitted to engage in coastwise trade. Vessel is permitted to operate only on a voyage on which passengers embark and disembark at the same coastwise point, on which no intermediate coastwise points are touched and shall, at some point during the voyage, depart the U.S. Territorial waters (3-mile limit). Fishing and dive operations are prohibited".

f. COI Endorsements:

(1) All inflatable boats shall have their COI endorsed with the following statements:
(a) “All passengers shall remain seated when the propulsion is engaged”.
(b) “Vessel to be operated under reasonable wind and sea conditions”.

(2) Vessels not equipped with a lighted compass shall have their COI endorsed with the following statement: "Operation during daylight hours only."

g. Plans and Calculations:

(1) All plans and calculations for new constructed vessels or vessels requesting a change in service should be submitted to the Marine Safety Center (MSC), Washington, DC for review and approval in accordance with 46 CFR 177 and reference (a). Submitted plans must provide sufficient detail to permit accurate modeling of the collar, rigid hull and the internal hull and collar compartments.

(2) Satisfactory service per 46 CFR 177.310, or OCMI judgement per 46 CFR 177.315 will generally not be used by this OCMI for approving structures on new vessels.

h. Stability:

(1) RHI's are required to demonstrate compliance with the stability for issuance of a stability letter. All stability calculations for RHIs must be submitted to MSC for review and stability letter issuance. The MSC created MTN 01-08 to provide owners/ operators an alternative design standard equivalent to the regulatory requirements in references (c) and (d) for RHIs.

(2) Reference (a) is not the only means of demonstrating compliance with Subchapter S, and MSC will consider other comprehensive engineering-based alternative design standards which provide an equivalent level of safety to the requirements of references (c) and (d).

(3) Simplified Stability Test (SST) per 46 CFR 178.320 will not be used by the OCMI as a basis for issuance of stability letters for new vessels.

(4) Inherently stable determination by the OCMI in accordance with 46 CFR 178.320 (c) will not be used as a basis for issuance of stability letters for new vessels.

Should you have any questions regarding this Work Instruction, please contact the Sector Honolulu Vessel Inspections Division at (808) 522-8264.

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