**OSV HW 7 – LIFTBOAT INSP/NOMENCLATURE + 5/10 YR LEG INSPECTIONS**

**ANSWER KEY**

1. What subchapters are Liftboats inspected under and why? (Applicability and dates).
	1. What guidance do we have for existing Liftboats?

**Liftboats are inspected under the following subchapters**

**I – Existing OSV – keel laid before 15MAR1996 & over 100 GT (46 CFR 90.05-20). New OSVs may fall under this subchapter if they are performing industrial work. This includes carrying freight for hire, oceanography, dredging, cable laying, construction/wrecking, and dive operations. Dive operations are weird in that they have been classified as “L” work if it supports the outer continental shelf and energy exploitation.**

**L – New OSVs – any OSV after 15MAR1996 – 46 CFR 125.100**

**T – Existing OSV (46 CFR 175.400) – keel laid before 15MAR1996 & under 100 GT.**

**Guidance for existing Liftboats**

1. **CID MEMO 3 – Inspection of Liftboats**
2. **19NOV1997 D8 Policy LTR – Subchapter L applicability for existing Liftboats**
3. **NVIC 8-91 – Inspection of existing, uncertificated OSVs, including Liftboats**
4. Explain how the leg and jacking system work for the Liftboats and areas of concern that you are focused on during your inspection of the system.

**Liftboats utilize a hydraulic jacking system in order to move their legs up and down to spud into the ground for stability (utilizing the crane). The typical setup for the jacking system is 3 motors, connected with hydraulic lines from a prime mover that causes the motors to turn. Inside the tower sponson, the motor is connected with a pinion that interfaces with the leg rack teeth in order to move the leg up or down. The leg rack is the length of gear teeth that run the vertical length of the leg. Liftboats spend a majority of their life jacked up out of the water, so there is constant stress on the length of leg rack that interfaces with the pinion.**

**Areas of concern for inspection (MSM Vol II (G6-9) & CG-543 Policy Ltr 07-02)**

**Pads – main load bearing area of the vessel.**

**Leg Tower Sponsons – critical to the support of the leg and tower, acts as a guide for the leg and motor interface.**

**Leg – check for deformation or cracking**

**Leg racks – visually inspect teeth, especially areas that interface with the pinion. Check for chipping, damage, or missing teeth. “Butts” are where two sections of leg racks meet and are welded together onto the leg.**

**Hydraulic hoses – (external and exposed to weather) – check for leaks and should be replaced every 5 years**

**Motors – check for oil analysis (water, degradation, metal shavings), review internal inspection report of bearings, planetary gears, and brakes**

1. What are the unique alarms/equipment and tests required for the Liftboat jacking system that should be observed during your inspection?

**46 CFR 134.150(b)**

**CG-543 Policy Ltr 07-02)**

**Level Alarm (NVIC 8-91) – level indicator to indicate level height and distinct alarm to warn of uneven leg sinkage. Usually a 2-stage alarm (1.5 and 3 degree offset) (Pendulum type with an arm that makes a contact with the alarm at the degree)**

**Low Hydraulic Oil Level Alarm – audible and visual at main operation station for main jacking system tank**

1. How do you test the murphy switch for the hydraulic jacking system tank?



**To test the murphy switch, the tank should normally need to be opened and the float on the back of the level indicator moved down to simulate a low level condition to observe the alarm. The switch should NOT be disconnected or the connection modified to alarm the low level.**

1. Are Liftboats required to have a SOLAS approved rescue boat? If not, why?

**12NOV1998 D8 Policy LTR & 25AUG1999 D8 Response to OMSA**

**If the OSV is inspected under subchapter L, then yes.**

**If the OSV is inspected under subchapter I/T (Existing OSV), then no. It is required to have a workboat with the equipment listed in 12NOV1998 D8 Policy Ltr and engines no less than 15 HP.**

1. Can a Liftboat have a rescue platform?
	1. Are there any substitutes for a rescue platform that can be used onboard?

**A Liftboat can have a rescue platform if it is highly maneuverable and can act as its own rescue platform (leg/pad is retracted to hull and creates a platform). This would only apply for afloat mode and the Liftboat would still need a rescue boat/workboat for recovery ops when jacked up.**

1. How do you know the operational limits/parameters of the Liftboat?
	1. What is the approval process for this?
	2. What guidance do we have for the contents of this document?

**NVIC 8-91 requires every Liftboat to have an Operating Manual. MSC should review their applicable sections (construction, stability, and leg strength calculations). Then the unit will review the MSC approval ltr and the rest of the sections of the manual (See CID MEMO 6 enclosure (1) for a full list of items that should be included).**

**Content guidance comes from CID MEMO 6.**

1. Define Air gap. Why is this important?

**Air gap is the distance between the hull and the waterline when jacked up. This is important because it should be compared to the max wave weight for operating to ensure that the air gap is more for safety concerns.**

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1. What type of fire pump does a Liftboat typically have? Any different requirements than a conventional vessel?

**Submersible for when the vessel is jacked out of the water. There will be a flexible hose connection for suction on the submersible hose and this should be routinely inspected for condition and serviceability. The launch appliance for lowering the pump should also be inspected.**

**46 CFR 134.180(b) – suction lines that extend below the main deck outside the hull must be metallic, unless they comply with 46 CFR 56.60-25(c) for vital fresh-water and salt water service, and may be of unlimited length.**

1. What are additional items of the Liftboat that must be checked during drydock? Please describe each structure and its official name (i.e. Pad – connection at the bottom of the legs that are the main load bearing area of the vessel)

**CG-543 Policy LTR 07-02**

**Pads – Entire pad (top, bottom and sides) should be visually inspected for damage or insets. The “leg to can” and “can to pad” connection welds should be NDT at every hull exam (UT or Mag Particle). Concern of wastage and watertight integrity.**

**Leg Tower Sponsons – Check for deformation and fractures.**

**Legs and Leg Rack – Leg rack is where the hydraulic motor drive meets the leg rack (gear teeth strip). Lot of torque is applied at this connection. Check for chipped, damaged or missing teeth and excessive gear wear. Lower terminus should be NDT (dye pen/mag particle) at each drydock for cracking.**

**Leg-to-Tower Clearances – too tight and the system may bind. Too loose and the system may wobble/improper rack-pinion operation.**

1. What Liftboats are required to “pull” legs and what are the intervals?

**MSM Vol II G6-11 – Vessels operating exclusively on protected routes (LBS) are exempt from leg removal unless circumstance dictate their removal for repair (marine casualty).**

**Leg removal cycle starts 10 years after the vessel’s delivery date, with the first removal occurring at the first scheduled drydock after 20 years from delivery.**

**Start at 20 year mark, then pull legs every 10 years after (30,40,50).**

1. What is required for a 5 yr leg inspection?



1. What is required for a 10 yr leg inspection?



1. What is the difference between the two?

**10 yr inspection requires entire leg to rack connection to be NDT.**

**The lower and uppermost gearboxes must be pulled for the 10 yr. 5 yr only requires the lowermost gearboxes.**

**Tower roundness is checked at 10 yr, not 5 yr.**

**Tower thickness is checked at 10 yr, not 5 yr.**

**Pad thickness is UT at 10 yr, not 5 yr.**

**All leg butt welds and UT bands of leg thickness at 10 yr, not 5 yr.**

**Internal inspection of legs (ladder points and butt welds).**

1. What is being inspected when the gearboxes are pulled?

**Oil analysis of the gearboxes, compared to original sample of oil (control). Looking at water intrusion, viscosity, and metal particulates. Additional internal exam of brake discs, planetary gears, and overall wear/corrosion with internal springs/mechanical parts (gears). Should be 2 reports, one for the oil and one for the internal exam.**

Gearbox oil analysis should be conducted prior to internal inspection of gearboxes. Any noted “critical” in their report should be pulled for internal exam.

1. Is there any special requirements/alternatives for Liftboats with gearboxes on both sides of the legs?
	1. What is the requirement for this arrangement for 5/10 yr leg inspections?

**29May2019 MSD Lafayette Policy Ltr – Recommended inspection procedures for single and double racked Liftboats**

**For double-racked Liftboat legs, alternating lower/upper gearboxes should be pulled for the 5/10 yr leg inspections.**

1. What kind of NDT is used for the rack to leg welds and why?

**Magnetic particle is used due to the rounded surface of the leg. Magnetic particle also detects surface and sub-surface defects.**

1. What level technician is required for this and where would you find guidance on this NDT method?

**Level 2 technician, ABS NDT guide.**

1. Do you have to replace hydraulic hoses for the jacking system that are within the skin of the ship? (Some Liftboats have hydraulic hoses in their machinery voids for the jacking systems).

**Only external hydraulic hoses that are exposed to the environment are required to be replaced every 5 years.**

1. What guidance do we have for Liftboat leg and tower repair?
	1. Can you do a 12” x 12” insert on a leg?
	2. Can you replace 6” of the rack if it is corroded?
	3. What is the wastage allowance for the pad?

**MSFO Lafayette Recommended Repair Guide for Liftboat Leg and Leg Towers**

* 1. **No inserts are allowed on a leg unless it is a complete spool piece. The minimum size must be 1.5 times the diameter of the leg.**
	2. **The minimum size rack replacement is typically 24” but can be shorter to accommodate the timing of the rack to pinion ration. Single tooth repair is never authorized.**
	3. **Allowable wastage is 25% for ¼” and greater, 10% if less than 1/4”**