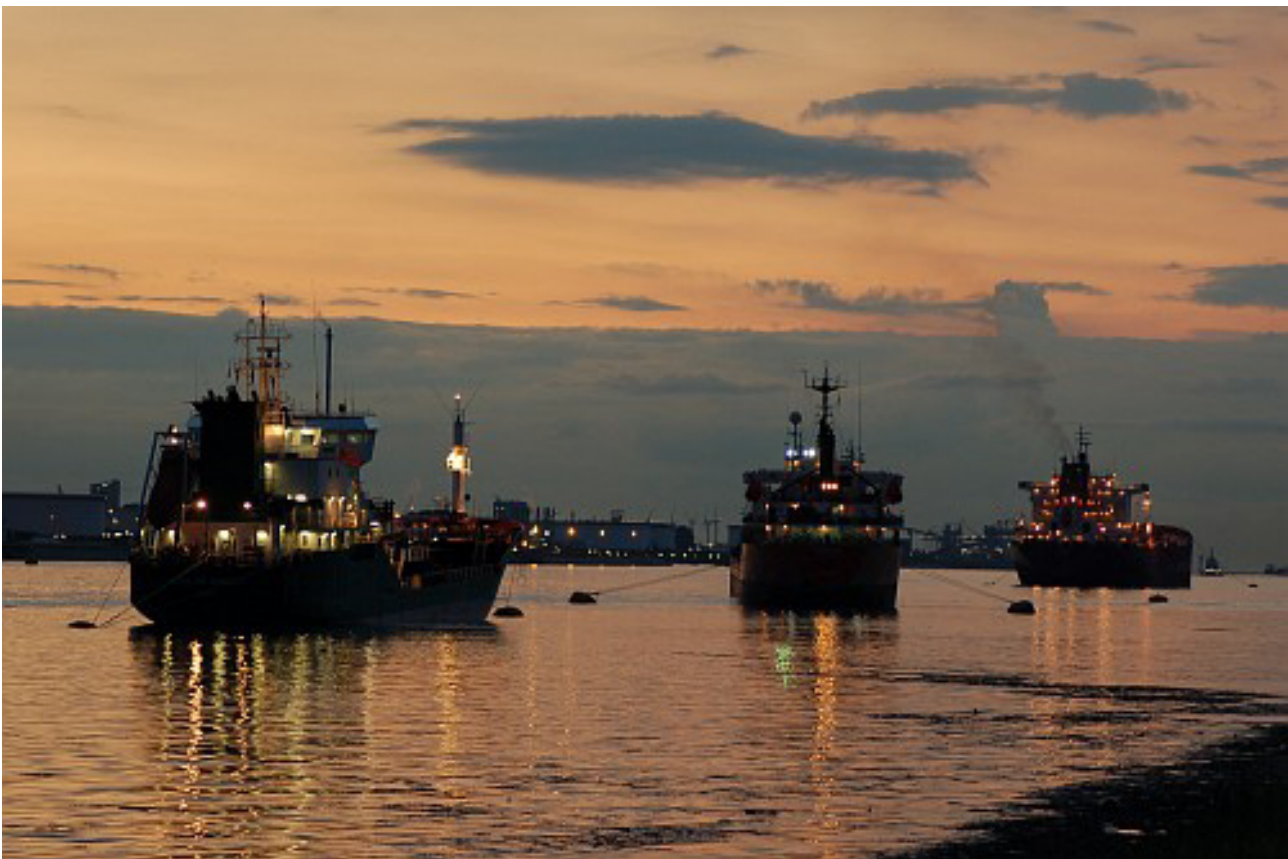


## Guidelines for lay-up of ships

*Suggestions to help minimise P&I claims, including personal injury, wreck removal and pollution and other contamination of the local environment*



### Introduction

In conjunction with BMT Marine & Offshore Surveys (Incorporating The Salvage Association) the Club has proposed the following criteria and recommendations for lay-up arrangements in order to minimise P&I claims, including personal injury, wreck removal and pollution, particularly oil leakage, antifouling and other contamination of the local environment. Also damage to third party property, including other vessels, underwater cables, beaches and reefs, pleasure craft and aquaculture.

The guidelines have been drafted to assist the Club's shipowners in the preparation of their vessels for a period of lay-up and to provide recommendations for maintaining the ships in a safe and effective condition.

The laid up ships will be subject to all relevant national, port and other statutory requirements, agreement by Hull & Machinery insurers and the recommendations of the relevant classification society. Supporting documentation including agreements and certificates

from these parties should be readily available for reference. The proposals outlined below are subject to compliance with all such requirements and recommendations.

Manufacturers of machinery may additionally provide guidance on the long-term protection and maintenance of their equipment.

Prior to commencing the lay-up of a vessel the shipowner or operator should carry out a full risk assessment covering the suitability of the site, safety of the crew, vessel, mooring and environment and also the preservation of the vessel and machinery. Written procedures for the lay-up, manning, maintenance and inspection should be prepared and all likely risks suitably managed. Professional guidance should be sought if necessary.

It should be noted that these proposals are of a general nature and are not intended to be complete or covering all circumstances or vessel types, and may be modified to suit a particular ship or situation.

Both the UK Club and BMT Marine & Offshore Surveys, their subsidiaries and affiliates, including all officers, employees, surveyors and agents assume no responsibility and shall not be liable to any person or organisation for any loss, damage, injury or expense, howsoever caused, resulting from any reliance on these proposals and the information and recommendations contained in this document.

## Lay-up philosophy

There are two basic criteria that the lay-up is designed to meet:

- To maintain the security, safety and protection of the vessel, crew, and the environment.
- To preserve and maintain the structure and machinery by providing protection against corrosion and static seizure.

The extent to which a vessel's owner will lay-up any ship will depend on a number of factors, including, the expected period of lay-up, need to reduce overhead running costs, anticipated time to resumption of trading, time needed for reactivation and the age and value of the ship.

The vessel can be laid up either in 'Hot' or 'Cold' mode. There will, however, be variations on these modes as owners elect different time scales, manning requirements and degree of lay-up.

'Hot' lay-up is usually relatively short term and means that the vessel may have a reduced number of crew on

board and will have some of the machinery working. The advantages are that the vessel can be easily laid up and it can be reactivated with less cost, time and effort.

'Cold' lay-up for a longer term requires the vessel to be moored in a secured location and all systems are shut down with minimum ongoing maintenance to prevent deterioration of the hull structure and machinery. A specialist lay-up crew may be employed, possibly only a watchman from a contracted 'housekeeping' company will be on board for much of this period. There are a number of disadvantages to cold lay-up, particularly machinery or hull degradation and subsequent reactivation could take weeks. The vessel may require dry-docking as part of the reactivation. If reactivation procedures are not correctly carried out, serious long term damage to the machinery may be caused. One area of uncertainty is that modern vessels have a large amount of sophisticated computer equipment and there is little current experience that these systems will start up again when the vessel is reactivated after a long lay-up.



## Approval of lay-up site

Until being disbanded in January 2001 the ILU/IUA Joint Hull Returns Bureau maintained a record of around 400 approved sites worldwide, however, the subsequent changes in infrastructure and conditions at some of these sites may mean that they are no longer suitable to be approved. In addition increases in vessel size will mean that many old locations are not suitable for modern tonnage. As a result consideration should be given that each new location may need to be surveyed before being approved.

This process will include but not be limited to assessment of the following:

- Degree of shelter provided from open seas, winds, waves, swells etc.
- Method of mooring vessels: including ships berthed alongside, at buoys, anchors, stern moorings, anchored rafts of several vessels, etc.

- Availability of spare or replacement mooring equipment.
- Detailed climatological information from best sources available relating to likely maximum force and direction of wind, waves and swell, and incidence of cyclones, hurricanes, ice, etc. Reliability of local weather forecasting services.
- Local currents and tides.
- Tidal range.
- Bathymetry and anchorage depth and type of holding ground, with diver or sonar surveys as appropriate.
- Depth of water to be sufficient to remain afloat at all stages of the tide with sufficient under keel clearance.
- Proximity to any obstructions, wrecks, underwater cables or pipes.
- Details of local authorities and availability of tugs, fire fighting, medical & safety services.
- Availability of services such as fresh water, waste disposal, shore power and repairers.
- Security of location.
- Assessment of likely hull fouling due to marine growth.
- Location of any effluent or corrosive discharges.
- Proximity to passing traffic and other moored vessels.
- Proximity of any commercial aquaculture including fish farms, oyster beds, water intakes etc.
- Space available or number of designated lay-up positions.
- Suitable access and egress channels, pilotage, tug assistance during mooring, etc.
- Proximity of underwater cables, wrecks etc.
- Potential windage of vessels, containers on deck, etc.
- Facilities for shore monitoring of vessel position, remote GPS monitoring etc.

## Approval of lay-up arrangements

This will include the following main aspects:

- The method and safety of the mooring and all the

various activities relating to the safety of the vessel and crew.

- The preservation of the vessel and her machinery and equipment to prevent damage or deterioration and to assist with subsequent reactivation.
- Approval of arrangements by Flag State, Port State, harbour authorities, classification and hull and machinery and their appointed surveyors.

## Mooring arrangements

The main part of these arrangements is to firstly check that the ship is safely placed in the mooring, and then that appropriate laying up arrangements are made. The mooring arrangements vary considerably depending upon the location chosen and are dictated by topography and bathymetry. For example in fjord



situations the ships are moored by anchors forward and wires to the shore aft. In sheltered bays they are laid together in rafts, bow to stern, with anchors at both ends. In some benign areas they are laid on a running mooring with both anchors laid out. Vessels may also be laid up alongside a suitable berth.

The following are points to consider:

- The mooring must be sufficient to hold from the severest wind expected from the most unfavourable direction. Assessment of depth of water compared to vessel draft and freeboard.
- Always ensure that the anchors are well pulled in, and the chains are as straight as possible and stretched tight. A normal scope on the anchor could be 10 shackles, but more can be used.
- If in any doubt regarding anchors holding they should be picked up and re-laid, and a diver put down where necessary. Anchor positions should be marked with buoys to show locations and to facilitate recovery if slipped.
- If wires are used astern they must be under even tension, taut and kept tight.
- Position of anchor chains and mooring lines to be varied at regular intervals to prevent uneven wear in way of contact points such as hawse pipes, fairleads, winches, etc.
- Suitable fendering and safe gangways with

adequate lighting must be placed between ships and between ship and quay.



- To minimise windage and improve anchor holding, tankers should take about 30 percent deadweight ballast, and bulk carriers should have maximum ballast.
- Except in special circumstances, mooring for lay-up on a single anchor has been found unsatisfactory.
- High profile vessels such as car carriers, passenger/cruise ships and container vessels with container stacks will require allowances to be made for the additional windage when assessing the mooring arrangements.
- Final lay-up draft marks forward and aft to be painted conspicuously with white lines on port and starboard sides.
- Rigging of emergency towing lines fore and aft, ready for use, without adjustment, should the vessel need to be towed off.
- Where multiple vessels are laid up together, either alongside or in anchored or moored groups or 'rafts', they should be of a similar size. Vessels alongside should normally be not more than three abreast and all heading in the same direction. When moored in rafts vessels are normally not more than six abreast and anchored so that they are heading in alternate directions and secured bow to stern.

## Security, safety, protection and environment

The objective is to provide and maintain:

- For a hot lay-up sufficient and qualified ship's officers and crew should be onboard in order to maintain full time fire, leakage, mooring, safety and security watch of the vessel. For a cold lay-up efficient, independently powered fire and flooding alarms and/or warning lights/whistles/klaxons to be fitted for machinery space, bilges and other spaces

as deemed appropriate. Remote monitoring to be utilised where relevant.

- A fire fighting capability to be provided through the sustained operational availability of emergency equipment and apparatus.



- The minimisation of fire risk through the removal of unnecessary flammable material, gas freeing and cleaning of certain compartments and by the employment of safe working practices.
- Arrangements should be made for the safe containment and frequent removal of garbage and sewage produced by crew or watch personnel.
- An evacuation facility through the operational upkeep of lifeboats/liferafts, breathing apparatus and associated equipment.
- Protection to compartments and machinery by sealing all air intake and exhaust openings which are not required.
- On board security by means of limiting access by boarding, securing and sealing of doors into the accommodation and other spaces. Provision of suitable alarm systems with remote monitoring.
- Provision of a safe working environment for crew on board or for watchmen and maintenance crews.
- The minimisation of risk of air pollution.
- Enclosed spaces to be ventilated prior to entry.
- Oil tanks to be drained, cleaned and maintained in gas free condition and tested at regular intervals, and all oil pipelines drained and cleaned prior to long term lay-up.

## Preservation and maintenance

The objective is to eradicate accelerated corrosion and seizure through the:

- Total and effective sealing of major accommodation and machinery spaces from external atmospheric conditions, particularly where high humidity levels exist.
- Controlled dehumidification of internal air spaces

(including void spaces within machinery and pipelines) to prevent sweating and humidity corrosion damage, as well as moisture absorption into electrical cables and fittings.

- Regular turning of rotating machinery to prevent corrosion damage to bearings, seizure and component distortion.
- Application of preservatives and suitable lubricants to external equipment and machinery not within the dehumidified spaces.
- Hull cathodic protection to be maintained, and for long term lay-up ballast tanks to be suitably protected.



- Visual checks on oil levels in machinery sumps.
- Visual checks on all 'filled' systems for leaks, such as hydraulics, fuel, lubrication oil, air conditioning and water.
- Visual and measurement checks of battery systems.
- Live test of emergency fire pump and system.
- Measurement checks of electrical circuit insulation continuity.
- Visual checks on all occupied storage tank levels.
- Periodic visual examination of all opened machinery and equipment within dehumidified spaces.
- Periodic underwater survey by qualified diving contractor.
- Measurement checks on hull potential (cathodic protection system).

## Inspections

The objective is to conduct regular inspections either by a skeleton crew or a contracted service company and carry out tests on structure, machinery and equipment through established techniques to ensure that the standard of preservation is maintained. Inspection regimes should be fully documented in advance of lay-up and may include daily, weekly, monthly or annual activities. Full procedures and necessary records are to be maintained.

Such checks will include:

- Frequent checks of mooring and fendering arrangements.
- Frequent checks of embarkation, lighting and other safety systems.
- Frequent checks on communication systems.
- Regular bilge and other soundings.
- Regular checks on operation of emergency equipment and apparatus, fire, leakage, and security systems and alarms (see *Security, safety, protection and environment*).
- Visual checks on 'controlled' space sealing arrangements.
- Measurement checks on relative humidity levels within 'controlled' spaces.
- Visual checks on protective coatings of all external machinery and equipment.



## Preparation procedures

### Controlled humidity space sealing and dehumidification

The owners/contractor will provide all the necessary material and equipment to establish and maintain a controlled dehumidified atmosphere within designated areas including:

Main Machinery spaces at 30 - 50% RH

Accommodation spaces at 45 - 55 % RH

All openings including doors, windows, port holes, vent/extraction apertures, sanitary outlets, scuppers, drains and air intake grids should be secured and sealed using proven methods. Limited means of access to be retained.

Dehumidification units of adequate capacity to be sited

and installed, together with associated distribution trunking to achieve sufficient air circulation both within the 'controlled' spaces as a whole and through major individual items of machinery, equipment and systems within those spaces. The circulation of dry air will be arranged such that the desired levels of relative humidity will be achieved throughout.

All water/steam systems and tanks within the controlled spaces, except those required for the lay-up operation will be drained free of water (including bilge areas), dried and left open to dehumidified atmosphere. Non-return valve internals will be removed where necessary to improve air circulation within the systems.

### Internal machinery and equipment

Individual machinery within the dehumidified spaces should be treated as follows:

#### Internal combustion engines

- Fuel oil lines to be isolated, injectors removed, cleaned, coated with oil and stowed.
- Cylinders to be lubricated with lube oil whilst engine is turned by hand.
- Cooling systems to be drained of water and left open to dehumidified atmosphere. Where neoprene sealing rings are fitted, system will be left charged to prevent dry out and corrosion inhibitors added.
- Sea water systems to be drained and opened to dehumidified atmosphere.
- Selected inspection covers to be removed to allow free circulation of dry air throughout the machine.
- Exhaust lines will be blanked.

#### Air compressors and system

- Lube oil to be drained whilst warm, system recharged with clean oil and machine run for 5 minutes before final shut-down.
- Unless the compressor is required for use during lay-up routines, covers and valves on all stages should be removed and cylinders lubricated.
- Air filters and inspection covers to be removed and header drains left open to allow free circulation of air.
- Receivers to be drained and mopped dry and drains and inspection doors left open.

#### Fresh water systems and pumps

- Internals to be drained and dried out. Inspection covers and drain plugs removed for air circulation.

- Suction strainers to be drained and left open.

### Salt water systems and pumps

- All sea water to be drained from pumps and associated systems and left open to the dehumidified atmosphere.
- All strainers to be drained, mopped dry and left open together with selected valves, thus permitting the circulation of dry air.

### Fuel oil purifiers

- Internals to be removed, cleaned, coated with grease and stowed.
- Bowl and crankcase will be left open to atmosphere.
- Crankcase to be drained, cleaned and charged with new oil of owners supply.



### Accommodation

If the vessel is laid-up unmanned then:

- In addition to external sealing arrangements described in *Controlled humidity space sealing and dehumidification*, all sanitary fittings to have openings sealed and water supply systems isolated.
- All provisions stores to be emptied, cleaned and doors secured in open position.
- All cabin linen to be stowed in a central locker in clean condition, mattresses stood on edge and all cupboard and cabin doors secured in open position.
- All access alleyway decks to be covered with H/D polythene.
- All navigation and communication systems to be isolated (except local VHF Trans/receiver) and room doors left open to ensure good air circulation.

- Accommodation spaces to be sprayed with insecticide to prevent infestations of cockroaches etc.
- Lighting circuit breakers to be opened where relevant leaving only the emergency lighting circuits in use during lay-up.

### External equipment

- All moving and working parts of deck fittings to be proved free and thoroughly coated with preservative grease. Crane cabs to be secured and sealed and control positions covered and secured.
- Arrangements to be made for the regular turning of steam/hydraulic deck machinery on air. Internals of engines and all working parts to be regularly lubricated.
- Lifeboats and davits to be kept in good working order, being regularly lowered and the engines run on test.

### Electrical installation

- Electrical power to be provided by a portable diesel generator or shore power when available. This will minimise the utilisation of the vessel's own emergency generator which can then be laid up. Temporary cables to be supplied and safely installed as necessary.
- Full insulation tests to be carried out on all distribution systems and motors at the commencement of lay-up, readings recorded and submitted to owner on a regular basis.
- The condition of external motors to be monitored by taking regular insulation readings and if the condition deteriorates to a point where it would be detrimental to the motor then, where possible, it would be removed and stowed in a dehumidified area.
- All starters, control panels and distribution boards within dehumidified spaces, where safe to do so, to have access doors partially opened to allow free circulation of dry air.



carefully recorded, documented and photographed. Copies of such records to be retained on board during the lay-up period for use during subsequent reactivation.



- Any spares or equipment subsequently removed for operational purposes such as transfer to other operational vessels to be recorded for replacement during later reactivation.
- Log books of all activities on board to be maintained.

### General

- All machinery and equipment components removed from their normal location to be properly labelled and stowed adjacent to the parent unit within the dehumidified spaces. The parent unit to be marked with appropriate labels where such components have been removed.
- Apertures/inspection openings where covers have been removed for air circulation to be covered with fine mesh wire gauze to prevent ingress of foreign matter.
- External equipment removed to within the dehumidified spaces to be properly stowed, the storage location carefully recorded and the normal location site labelled.

### Maintenance during lay-up

Lay-up routines to be carried out throughout the laid up period by skeleton staff or contractor, including checks as listed in the section titled *Inspections*.

Main engine and auxiliary engines, compressors, pumps etc to be regularly turned with lubrication oil under pressure. Engines to be stopped in a different position each time.

### Owner's responsibilities

#### Safety requirements

- All safety equipment is to be in good working order and fully tested prior to lay-up. Lighting, fire fighting and lifesaving equipment to be maintained in operational condition during lay-up.
- All combustible and flammable material not required

during lay-up to be removed prior to lay-up, including chemicals and paint.

- All compartments must be gas free.

## Manning

- The owners must retain sufficient crew on board to carry out the lay-up preparation. The crew can be reduced as work progresses until the vessel is finally de-manned or reduced to an agreed skeleton crew. If unmanned, the contractors to provide watchmen to ensure the security of the vessel, and staff to carry out maintenance routines.
- Reductions in manning below minimum manning levels should be agreed with the relevant Flag State and any necessary dispensation obtained.

## Structure

- Underwater area must be adequately protected with sacrificial anodes and hull potential to be at a satisfactory level.
- During lay-up ballast tanks should be maintained either full or empty. Full tanks may be protected by means of corrosion inhibitors or sacrificial anodes. Empty tanks should be dried out to minimise corrosion.
- All sea valves to be fitted with internal blank flanges. External sea suction to be closed off by divers using fibreglass blanks fitted with neoprene seals. The blanks to have a pocket so that a biocide brick can be inserted to prevent marine growth in the grids.
- The stern seal to be checked externally by divers to ensure there are no ropes or lines penetrating into the seal assembly that could result in leakage.
- A safe access to the vessel must be provided for contractor's watchmen and maintenance crews.



## Electrical installation

All electrical equipment and cables must be in good condition, particularly those required during lay-up such as engine room and accommodation lighting systems and main and auxiliary switchboards.

## Cranes

At least one stores crane should be in good working order for use during the lay-up period, and have valid load test certificates issued.

## Stores and provisions

All excess or unnecessary equipment, stores and provisions should be off-loaded, particularly in long term lay-up situations.

