OCIMF

Survival Craft

A Seafarer's Guide

OCIMF's mission is to be the foremost authority on the safe and environmentally responsible operation of oil tankers and terminals, promoting continuous improvements in standards of design and operation.

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Oil Companies International Marine Forum (OCIMF) is a voluntary association of oil companies having an interest in the shipment and terminalling of crude oil and oil products. OCIMF is organised to represent its membership before, and consult with, the International Maritime Organization (IMO) and other government bodies on matters relating to the shipment and terminalling of crude oil and oil products, including marine pollution and safety.

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Glossary

Administration	The Flag State to which a particular ship is registered and under which legislation the ship operates.
Davit Horn	The horn arrangement positioned at the top of the davit arm that takes the weight of the release gear and lifeboat off the falls when the lifeboat is in the stowed position.
Davit Launched Lifeboat/Liferaft	A survival craft that is lowered to the waterline while still attached to the davit falls, the speed of descent being controlled by the davit winch brake. Note: '*Davit Launched Lifeboats*' may also be referred to as '*Gravity Lifeboats*'
Drill	An event to practice and train for an emergency response. Also known as an '*Exercise*'.
Fall Preventer Device	A means of preventing inadvertent hook release or of restricting the potential movement of the survival craft by such release. Fall Preventer Devices include '*Maintenance Strops', 'Hanging Off Pennants' and 'Safety/Maintenance Pins*'.
Free-Fall Lifeboat	A survival craft that drops to the waterline solely under the influence of gravity and is not attached to the davit once it has been released.
Gravity Lifeboat	See '*Davit Launched Lifeboat*'.
Hanging off Pennant	A wire or strop that attaches the survival craft directly to the davit for use when performing maintenance on the falls or release hook.

Harbour Pin	A pin that mechanically prevents the operation of the davit. Traditionally used to prevent accidental release while alongside in port.
International Maritime Organization (IMO)	The section of the United Nations with responsibility for coordination of international maritime safety and environmental issues. Conventions and Resolutions passed by IMO are implemented onboard vessels, by individual Flag States, as legislation.
Morse Cable	A control cable that moves axially inside an exterior sheathing. It is often used for controlling outboard motor throttle operation and steering.
Personal Flotation Device	A personal flotation device is a device designed to assist a wearer, either conscious or unconscious, disabled or exhausted, to keep afloat with their mouth and nose (airway) above the water surface. Also referred to as *PFD, lifejacket, life preserver, Mae West, life vest, life saver, cork jacket, life belt, flotation suit*.
Recovery Strop	A soft strop or strops that connect between the release hook and the survival craft to separate the heavy hook arrangement from the seafarer when recovering the survival craft during heavy sea conditions. Also referred to as '*Heavy Weather Strops*'.
Release Hook	The hook that connects the survival craft to the davit.
Remote Releasing Wire	The control wire by which the winch brake of a davit launched lifeboat can be released from within the lifeboat.

Safety/ Maintenance Pin	A fall preventer device that comprises of a pin that mechanically blocks the release hook from opening.
Simulated Launch	A simulated launching is a means of training the crew in the free-fall release procedure of free-fall lifeboats and in verifying the satisfactory function of the free-fall release system without allowing the lifeboat to fall into the sea.
Survival Craft	Is a craft capable of sustaining the lives of persons in distress from the time of abandoning the ship. Often referred to as '*Lifeboats*' or '*Liferafts*'.
Toolbox Talk	The safety briefing that takes place before an activity commences that informs all participants of expectations and possible hazards.

Introduction

This guide has been published by the Oil Companies International Marine Forum with the aim of providing practical information to assist seafarers with the safe operation and maintenance of survival craft. Although the main focus of the guidance is directed at personnel onboard, it will also be of interest to shore managers and company superintendents having general responsibilities for shipboard safety.

Over recent years, there have been a number of serious incidents within the industry during the inspection, maintenance and routine testing of survival craft. The root cause of many of these incidents has been identified as changes in equipment design which, in-turn, have led to a lack of familiarity with the operational and maintenance requirements of installed equipment. This is perhaps most noticeable with on-load release systems, where a large number of differing approved designs has the potential to lead to confusion with regard to the mechanism's operation and maintenance requirements.

It is recognised that the International Maritime Organization, together with industry organisations representing the broad spectrum of manufacturer's and users, is actively developing revised design criteria for survival craft. However, this work may take some time to complete and it will be several years before any agreed measures are universally adopted and implemented within the industry. The guidance contained within this publication is aimed at bridging this gap by recommending measures that are applicable to existing systems and their safe operation.

Previous studies of survival craft incidents have identified unplanned hook release during routine activities as the event most likely to cause serious injury or damage. Several recommendations within this guide are aimed at preventing such incidents and include the use of control measures, such as fall preventer devices, during exercises and drills involving the launching or recovery of survival craft.

The structure of this guide recognises the different types of survival craft that may be found onboard. Section 1 'Equipment', Section 2 'Maintenance and Inspection' and Section 3 'Familiarisation and Training' address general issues that are applicable to all survival craft. Separate sections then consider individual types, which are broadly categorised as 'davit launched lifeboats', 'free-fall lifeboats', 'dedicated rescue boats' and 'davit launched liferafts'. Particular issues relating to the survival craft type, together with its launching and recovery, are described in each of the separate sections. Finally, the Annexes provide examples to assist with the development of onboard procedures and risk assessments that address the launching and recovery of survival craft.

The guidance is considered to be of primary relevance to personnel serving on tankers and gas carriers. However, many of the recommendations will also be applicable to seafarers serving on other types of cargo ship.

Section 1

Equipment

The design, construction and testing of Survival Craft, including lifeboats, liferafts and rescue boats and associated equipment, are conducted to pre-determined rigorous standards that are described in the International Life-Saving Appliance (LSA) Code, which has been mandated by the IMO in compliance with requirements of the 1974 SOLAS Convention.

The large number of manufacturers of this equipment has led to numerous combinations of lifeboat and davit arrangements, as well as currently over 70 different types of release hook mechanisms. Each combination has its own very similar, but also very different, way of operating, which has resulted in the seafarer being faced with a major challenge when it comes to understanding each and every type of equipment they may face at sea. Although the industry is striving to rationalise the functional design and ultimate standardisation of this equipment, this may take several years to achieve. In the interim, there are certain steps that can be taken to ensure that the equipment can be safely operated and maintained.

Owners and Operators should consider:

- Standardisation of the equipment that they have within their fleet
- conducting detailed plan approval of the equipment provided on new build ships
- engaging the vendor(s) of the survival craft during final commissioning to ensure that equipment is correctly installed and to use the opportunity to provide vendor training
- ensuring that the operation and maintenance manuals provided use easily understood, concise wording, in English and the working language of those onboard
- ensuring that any modifications carried out on life saving appliances are undertaken in compliance with Flag State and

Classification Society requirements. When new or replacement equipment is provided, ensure that robust management of change procedures are followed to ensure compatibility

- ensuring that any issues and concerns are fed back to the vendor to promote the continued development of safe equipment
- promoting the effective dissemination of lessons learnt from any incidents and near misses involving survival craft, both within their fleet and to the industry through established groups representing interests such as ship operators, P&I Clubs and Classification Societies.

Seafarers should ensure that they are familiar with the specific equipment on their vessel by:

- Referring to the SOLAS training manual
- actively participating and supporting drills and exercises to gain 'hands on' experience of the specific equipment on their ship
- if required, to carry out maintenance routines, ensuring that they are fully conversant with the safe operation and maintenance of the equipment under their care.

It is important that all onboard are actively encouraged to provide feedback to the Master on any issues associated with survival craft, including safety concerns and operational difficulties, in order that owners or operators can be advised and implement corrective action.

Maintenance and Inspection

2.1 Maintenance instructions and manuals

Experience has revealed poor maintenance as a contributory factor to many incidents and near misses involving survival craft. Common concerns identified include painted grease points on hook assemblies, neglected wires, corroded cups, worn out chain links and shackles, corroded sheathed cables, incorrectly adjusted control cables and seized release levers.

In addition to the manufacturer's instructions, it is recommended that the operator's maintenance instructions also reflect lessons learnt from industry experience with the operating equipment installed onboard.

It is recommended that operators carry out a complete review of the specific types of survival craft and ancillary equipment installed onboard their ships and ensure that the manufacturer's instructions are clear and specific. If the manufacturer's maintenance instructions are not clear, they must be developed and clarified prior to inclusion in the Planned Maintenance System (PMS) and the SOLAS Training Manual. During this review, operators should define and highlight any critical equipment and associated maintenance requirements.

Risk assessments should be carried out as a fundamental pre-planning activity and should be included in the operator's Safety Management System. Any checks and/or maintenance carried out on survival craft should be the subject of a formal Risk Assessment, which should be the basis to proceed with the activity. The contents of the risk assessment should be available to all involved in the activity prior to implementing the company's adopted work procedures.

It is recommended that the use of 'fall preventer devices' (e.g. hanging-off pennants, maintenance strops, safety pins) be included

as a control measure in any risk assessment. Such devices are invaluable in preventing the accidental release of lifeboats during maintenance.

It is further recommended that the operator's maintenance instructions contains a section where terminology is clearly defined, and supported with visual or graphical representations of the defined items. This will be of benefit on ships with multinational crews and will reduce the risk of error due to misunderstandings. Examples of terms requiring clear definition are included in the Glossary.

2.2 Maintenance and inspection intervals

In accordance with SOLAS (Safety of Life at Sea Convention) requirements, operational checks and maintenance must be carried out at the following intervals as a minimum:

- Weekly
- monthly
- annually
- five yearly.

The following reflects the current maintenance requirements contained within SOLAS:

Weekly

- All survival craft, rescue boats and launching appliances shall be visually inspected to ensure that they are ready for use
- inspection of the condition of hooks and their attachment to the lifeboat
- inspection to ensure the on-load release gear is properly and completely reset

- all engines in lifeboats and rescue boats shall be run for a total period of not less than 3 minutes (If the special characteristics of an outboard motor fitted to a rescue boat would not allow it to be run other than with its propeller submerged for a period of 3 minutes, a suitable water supply may be provided)
- it should be demonstrated that the gearbox and gearbox train are engaging satisfactorily
- lifeboats, except free-fall lifeboats on cargo ships, shall be moved from their stowed position, without any persons onboard, to the extent necessary to demonstrate satisfactory operation of launching appliances, if weather and sea condition permit

  The requirement for completing the above test is to ensure that all moving parts of the system are operating correctly. A davit launched lifeboat should be lowered from its stowed position, so that half to one complete revolution of the stowage drum for the falls takes place. This will allow sufficient time to check all moving parts of the davit assembly, and prevent the boat from moving too far from the davit, reducing the risk of swinging damage to the boat.
- free-fall lifeboat secondary safety devices should be removed and refitted to ensure ease of removal during a real launch
- a report of the tests and inspections shall be entered in the Log Book or the Planned Maintenance System.

Monthly

All lifeboats, except free-fall lifeboats should be turned out from their stowed position, without any persons onboard, if weather and sea conditions so allow.

Inspection of the life-saving appliances, including lifeboat equipment, should be carried out monthly, using the checklist required by SOLAS Regulation 36.1, to ensure that they are complete and in

good order. A report of the inspection must be entered in the Log Book or Planned Maintenance System.

Annually

An annual inspection and maintenance by a service agent approved in accordance with the requirements of the ship's Flag State. In addition to the items included above for weekly and monthly inspections, the following should be carried out:

Davits

- Inspection of davit structure, falls and sheaves
- lubrication of davit wires, sheaves and moving parts
- function check of davit limit switches.

Lifeboat

- Condition of lifeboat structure including fixed and loose equipment
- engine propulsion systems
- sprinkler and air supply systems, if fitted
- manoeuvring system
- stored power system (batteries and hydraulic starter units)
- hydraulic systems.

Winch and brake

- Dynamic test of winch brake at maximum lowering speed. The load shall be the mass of the survival craft without any persons onboard
- inspection of brake mechanism (replacement of brake pads if necessary)

- remote control system (remote brake release)
- winch power supply system
- winch foundation.

Release gear

- Dismantling of hook release units
- examination with regard to tolerances and design requirements
- adjustment of release gear after assembly
- examination of vital parts with regard to defects and cracks
- hydrostatic interlock system, where fitted
- cables for control and release
- hook fastening
- operational test of on-load and off-load release gear.

Inflatable liferafts and inflatable lifejackets

- Shall be serviced by an approved service station at intervals not exceeding 12 months.

Hydrostatic release units

- Shall be serviced by an approved service station at intervals not exceeding 12 months unless single use, fixed life units are fitted, in which case they should be changed at the designated time.

Five yearly

Falls used in launching shall be inspected periodically, with special regard for areas passing through sheaves, and renewed when necessary due to deterioration of the falls or at intervals of not more than 5 years, whichever is the earlier.

In addition to the Annual inspection and service requirements, at intervals not exceeding 5 years, a dynamic test of launching appliances and on-load release gear shall be carried out with a proof load equal to 1.1 times the weight of the survival craft and its full complement of persons and equipment. Water sacks or sandbags are commonly used for this purpose.

Section 3

Familiarisation and Training

A significant factor in survival craft incidents occurring in the industry has often been identified as a lack of onboard familiarisation with the equipment fitted. It is imperative that a strong focus be given by the operator to the familiarisation and training of all ship's staff in the handling of survival craft, with the aim of minimising risk factors associated with human error.

The following are among issues that should be taken into consideration when developing an operator's 'Familiarisation and Training Programme':

- The ship-specific SOLAS training manual should be the prime reference source for onboard training. It should be ensured that the content of the manual reflects the equipment fitted on board and that the information is available in English and the working language of the crew
- posters providing warnings and instructions specific to the survival craft installed onboard should be prominently positioned at muster points and inside the survival craft. Launching instructions posted at muster and boarding points should be clear and appropriate to the equipment onboard. The provision of emergency lighting to ensure that the launching instructions can be read at night during a failure of the ship's main power supply should be considered.
- the use of manufacture-specific training material, where available, as part of the 'welcome onboard' joining programme, as well as being viewed prior to launching of the craft
- a video clip can be made onboard when launching survival craft during perfect conditions and may then be used in support of training activities

- a number of manufacturers or service providers now manufacture 'To Scale' models of the release gear mechanism, which are fully functional and are useful in providing hands-on training. Such models are of considerable value in increasing personnel understanding of release mechanisms and can instil a sense of confidence when operating the real mechanism

1. Note safety pin for use as a fall preventer device

Fig. 1 Example scale model used for training purposes

- the use of manufacturer's representative training, both onboard and ashore, covering operability and maintenance, should be considered. Operators may consider encouraging manufacturers to make such training available as part of their equipment provision and service
- the operator may consider developing type-specific Computer Based Training (CBT) modules.
- operators should disseminate lessons learnt from incidents and near misses from industry sources and should ensure that company procedures are reviewed to ensure that they address measures to prevent recurrence

- training, as opposed to 'drills', should be conducted in 'slow time' for new personnel to allow them to become thoroughly familiar with the equipment in a controlled environment
- adequate time should be set aside for drills, including post-drill reviews. The time selected for drills should take account of issues that include:
  - time pressures, both real and perceived
  - work patterns
  - crew changes
  - need to vary drill timing
  - maximising personnel attendance
- consider the ship's condition (loaded or in ballast) when launching survival craft. Should an inadvertent release be instigated, consider the potential damage in a loaded versus ballast condition
- drills form a major part of the hands-on training and should, as far as practicable, be conducted as realistically as possible, without compromising safety
- senior officers must be present during drills and the lowering of any survival craft
- consideration should be given to using a system of uniform colour coding for parts such as hooks and pins
- on completion of drills, it is important to conduct a formal de-briefing session and encourage all personnel to share their views and concerns. The de-briefing should:
  - identify best practices and lessons learnt for discussion at the next safety meeting
  - highlight any potential problems or concerns for forwarding to the ship's superintendent
  - provide verification of the appropriateness of documented procedures and guidance
  - prompt a review of controls contained in the risk assessment.

Davit Launched Lifeboats

4.1 Maintenance and inspection

In addition to the recommendations contained in Section 2, the following areas have been identified as posing a high risk when maintaining, inspecting and testing davit launched lifeboats:

- Brake mechanism failures and related issues

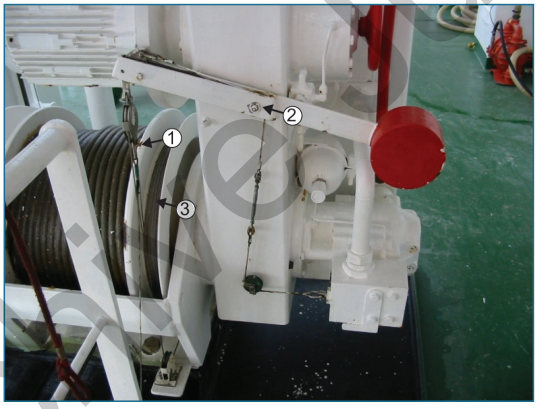
  Brake failure has been identified as being a significant contributory factor to past incidents involving davit launched lifeboats due to reasons that have included the following:

- Snagging of release wires resulting from:
  - the end of the wire becoming snagged inside the boat and holding the brake lever in the open position
  - the handle on the boat end of the remote release cable becoming trapped inside the boat and holding the brake lever in the open position. This can occur due to reasons that include:
    - the remote release wire being improperly adjusted resulting in the small counter weight coming up hard against the mini davit and holding the brake lever in the open position.
    - riding turns on the remote release wire storage drum, close observation is required if this is to be avoided.
    - remote wires being replaced and wound on the storage drum incorrectly.

In order to minimise the risks associated with the above, it is recommended that:

- a wire cutter is readily available
- excessive use of grease is avoided

- consideration is given to using stainless steel wire that does not require greasing
- consideration is given to using stainless steel blocks for the remote release wire
- the length of the release wire inside the boat is sufficient for lowering purposes
- if fitted, an assessment is made of the need to have the handle at the boat end of the release wire at all times. Consideration should be given to removing the handle prior to moving the lifeboat
- the storage drum for the release wire is checked for riding turns before each drill. Consider having one man watching this drum at all times during swinging out and recovery



1. Use of stainless steel wire
2. Stainless steel sheave
3. No riding turns on storage drum

Fig. 2 Arrangement for brake remote release cable

- poor maintenance of brakes:

  poor brake maintenance and brake design failures are the most common contributory factors to brake malfunctions. Additional factors include contaminated brake linings due to oil leakage from the gear box, incorrectly adjusted centrifugal brakes, incorrect lowering speed and the use of low quality spare parts

- hook release cables
  - the integrity of the cable should be regularly checked and it should be confirmed that end connections are secure
  - checks should be made for signs of potential corrosion in way of the cable penetration through the boat's hull
- use of 'hanging-off' pennants
  - when using 'hanging-off' pennants for hook maintenance and/or testing, the risks should be formally assessed and the operation carried out using the correct equipment and in a controlled manner

1. Arrangement for remote brake release cable

2. Clear access walkways

Fig. 3 Lifeboat at embarkation position

- hook assemblies
  - wear on the hook assembly, including cams and pins, may be overlooked during inspections as access is difficult without stripping the hooks down to their component parts. Effective overhaul requires knowledge of wear tolerances provided by suitably-qualified individuals
- wires and falls
  - the inspection of all wires, strops and fall preventer devices should be included in the Planned Maintenance System
  - regular inspection should be undertaken to verify the condition of the static parts of the lifeboat falls

Fig. 4 Limit switch for winch motor

- limit switches
  - limit switches are prone to failure, due to water ingress for example, and should be tested at every opportunity
- general precautions
  - ensure that maintenance strops and/or harbour pins are in place in case the release gear fails or the davits move
  - ensure suitable anchor points are provided for safety harnesses
  - access platforms should be designed to allow safe and clear access of the boats
  - flotation devices should be worn whenever working outside the ship's rails.

4.2 Familiarisation and training

In addition to the recommendations contained in Section 3, the following have particular relevance for davit launched lifeboats:

- The risk of unplanned hook release should be properly assessed. Controls to consider include:
  - supplementing the hook during drills through the use of fall preventer devices, such as a strops or chains between the fall block/chain and the hanging off link on the lifeboat
  - some hook designs include a fitting for a fall preventer device that comprises of a supplementary pin that prevents the hook from opening
- a significant number of incidents involving davit launched lifeboats have taken place during onboard drills and maintenance activities. Unless drills are completed in a controlled manner, these incidents may continue. Issues to consider include:
  - the use of fall preventer devices, such as safety pins or fall preventer strops, to prevent accidental release of the boat during drills

- planning to put the boats in the water well before the 3 month deadline. The chances are that the weather may not be satisfactory for a safe drill on the 3 month anniversary
- reducing the ship's speed to 5 knots or less during the weekly lifeboat drills to minimise lifeboat damage should the boat 'carry away'. (SOLAS requires boats to be able to be launched at a ship's speed of up to 5 knots)
- stagger the movement of boats during drills so that only one boat is moved at a time and that required senior officers are present when each boat is moved

- lifeboat painters should be marked for their correct rigging for both loaded and ballast conditions
- the correct operation of hydrostatic interlock systems should be fully understood by ship's personnel, together with the implications of the interlock's failure
- the fouling of gripes during the lowering process may result in injury to personnel and/or damage to the boat. To reduce the risk of fouling during drills:
  - auto release gripes should be manually cleared before boat is lowered
  - where possible and practicable, gripes should be released and moved clear of the boat prior to moving the boat
- the re-connection of waterborne lifeboats to the falls poses significant hazards that may be reduced by the following:
  - consider the use of recovery strops to facilitate reconnection.
  - if a dedicated rescue boat is available, consider using it as a tug/tender to position the lifeboat beneath the falls.
  - provide as a good a lee as possible to facilitate recovery.
  - consider prevailing sea conditions when planning to launch lifeboats.

- good communications between the officer in charge and the lifeboat coxswain are essential for the effective management of drills involving the launching of lifeboats. Where necessary, consideration should be given to the benefits of using headsets with walkie-talkies to counteract engine noise.

4.3 Launching

There are many different lifeboat and davit arrangements and all crew should be familiar with the specific equipment installed onboard and the related procedures for its operation. Reference should be made to the ship-specific SOLAS training manual, supplemented by training through drills and exercises.

Annex 1 contains an example of a step-by-step process for the launching and recovery of a davit launched lifeboat and this should be referenced when developing specific procedures for drills and exercises.

Annex 2 contains an extract from an example risk assessment that depicts the significant risks associated with the launching and recovery of a davit launched boat and shows how the process may be used to identify control measures and assess their potential effectiveness.

The following summarises the key guidance contained in earlier sections and the Annexes regarding the safe launching of davit-launched lifeboats:

- In order to ensure the satisfactory and safe operation of lowering and recovery arrangements, it is recommended that the lifeboat is lowered to approximately 1 metre above the water with no personnel on board. The boat should then be hoisted back into its stowed position and fully secured prior to personnel embarking

- it is recommended that no boat should be lowered to, or lifted from, the water during drills or exercises with personnel onboard unless a fall preventer device (FPD) is fitted. The FPD must be fitted before either the gripes or harbour pins are removed

Fig. 5 A synthetic strop as a fall preventer device

- normally, the fall preventer device should remain connected until the lifeboat is safely waterborne. However, consideration may be given to removing the FPD when the boat is approximately 1 metre above the water so that hydrostatic and remote hook release mechanisms can be checked for their proper operation

Fig. 6 A safety pin used as a fall preventer device

- should no fall preventer device be fitted, consideration may have to given to lowering the boat with no persons onboard to a level well clear of the water and then retrieving it. If safe means to board the boat are available, such as in port and using a hired craft, the lifeboat may be lowered to the water and personnel may access it once afloat
- good communications must be maintained between the boat's coxswain and those overseeing the operation onboard. Communication systems should be tested and back-up arrangements should be provided
- auto-release gripes, if fitted, should be manually removed and cleared away before the lifeboat is moved from their stowed position

Fig. 7 Examples of different hook arrangements

- particular attention should be given to ensuring the safe operation of remote brake release mechanisms and controls, the boat should be lowered in a controlled manner
- brake handles used for manual hoisting must be removed from the winch assembly whenever they are not in use
- the boat crew should comprise of the minimum number required to safely handle the boat. The crew should be experienced and the officer in charge should be trained and familiar with the particular equipment installed
- all crew should wear personal floatation devices and appropriate PPE and should be strapped into their designated seats within the boat while lowering and hoisting.

4.4 Recovery

- The use of 'recovery strops' (also referred to as 'heavy weather strops') should be considered to reduce the risk of injury to the boat crew when re-connecting hooks to the boat

- once the hooks are re-connected, the officer in charge in the boat must ensure that they are properly re-attached and re-set and that fall preventer devices are correctly re-installed or attached. Confirmation of the status of the hooks should be given to the Master prior to commencement of hoisting
- the boat should initially be hoisted just clear of the water. Additional checks should then be made by the officer in charge in the boat to re-confirm that hooks are re-set properly and fall preventer devices are in place and secure
- once the boat is hoisted to the embarkation position, it should be secured in position prior to the boat crew disembarking.

4.5 Post recovery

- Once the lifeboat is recovered, it should be adjusted in the davits so that the weight of the boat is taken by the davit horn, not the falls
- battery power supply cables should be re-connected and, if necessary, the lifeboat fuel should be topped-up
- where possible, the lifeboat's drenching system should be flushed with fresh water to prevent a build up of salt deposits. If possible, the same should be carried out for the lifeboat engine
- the lifeboat should be left ready for immediate launch with davit harbour pins and any fall preventer devices removed.

Free-Fall Lifeboats

5.1 Maintenance and inspection

In addition to the relevant recommendations contained in Section 2, the following additional considerations are applicable to free-fall lifeboats:

- If suitable access is available to the boat ramp, the condition of skid plates and the freedom of rollers should be regularly checked
- to guard against hydraulic hose failure, consideration should be given to the routine replacement of hoses during refit periods, particularly those hoses located in relatively inaccessible positions on the ramp or 'A' frame/recovery gear.

5.2 Familiarisation and training

In addition to the recommendations contained in Section 3, the following have particular relevance for free-fall lifeboats:

There are a large number of different manufacturers of free-fall lifeboats, each with differing methods of operation. It is therefore important that ship's staff are familiar with the operation of the type of lifeboat fitted to their ship.

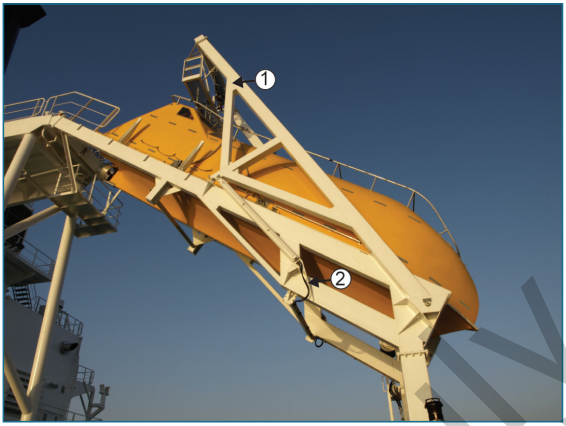
In addition to the initial familiarisation, all staff should undergo ongoing training and the following points should be taken into account when planning training:

- Consideration should be given to staff attending appropriate shore based courses or manufacturer's onboard training for free-fall lifeboats
- consideration should be given to the provision of appropriate CBT training aids
- routine onboard training sessions should be risk assessed and thoroughly planned with clear objectives

- there should be a procedure to enable the lifeboat coxswain to determine that the boat occupants are prepared for the launch. The procedure should be made clear to all staff during their familiarisation
- during onboard familiarisation, appropriate safety/maintenance pins or chains should be engaged to prevent inadvertent launching. Once such familiarisation/training is completed, these pins or chains should be removed so that the lifeboat is left ready for immediate launching in a genuine emergency.

The frequency and conduct of free-fall lifeboat launches should comply with SOLAS or Flag State requirements, whichever are more stringent. The present SOLAS requirements for launches are summarised as follows:

- At least once every three months during an abandon ship drill, the crew shall board the lifeboat, properly secure themselves in their seats and commence the launch procedure up to, but not including, the actual release of the lifeboat (i.e. the release hook shall not be released)
- the lifeboat shall then either be free-fall launched with only the required operating crew onboard, or lowered into the water by means of the secondary means of launching without the operating crew onboard, and then manoeuvred in the water by the operating crew
- at intervals of not more than six months, the lifeboat shall either be launched by free-fall with only the operating crew onboard, or simulated launching shall be carried out as specified in the manufacturer's operating instructions.



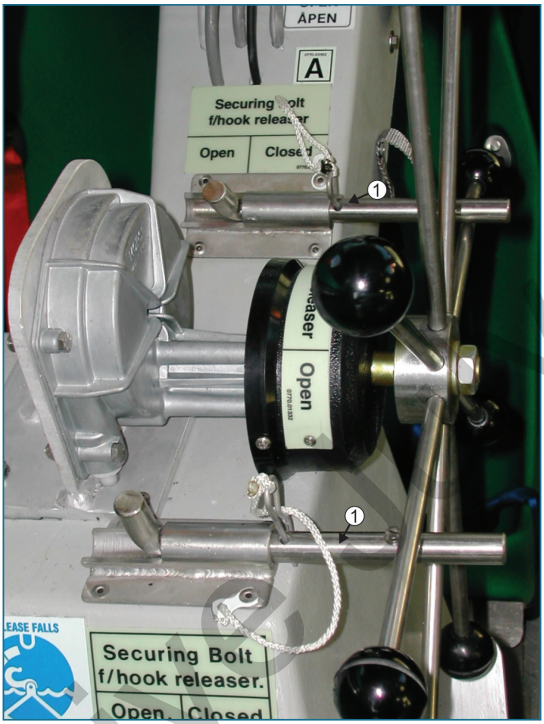
1. Frame used for boat recovery
2. Limited access to hydraulic lines

Fig. 8 Free-fall lifeboat in stowed position

5.3 Launching

- It is recommended that free-fall launches are carried out at more frequent intervals than required by SOLAS or Flag State, whenever safe and practical to do so, in order to maintain crew confidence in this equipment and to ensure that statutory requirements are met
- prior to launching, it should be ensured that the recovery mechanism is fully functional. Particular checks should be made to confirm the integrity of hydraulic systems
- if launching is to be carried out within a port or harbour limits, permission to carry out the launch should be obtained from the appropriate authority. Consideration should be given to the minimum distances required for safe launch and recover

- a risk assessment should be completed prior to any free-fall lifeboat launch, whether free-fall, wire launched or simulated. The risk assessment should cover all aspects of the operation, including recovery of the boat and the appropriate PPE to be used at all stages of the operation
- whether free-fall launching, wire launching or simulating a launch, it should only be carried out when the weather is suitable for launching and recovery. The manufacturer's handbook should be checked to see if any limiting criteria are given
- if free-fall launching, the area around the vessel's stern should be confirmed as clear of any obstructions, both floating and submerged
- for both free-fall and wire launching, the vessel's rescue boat should be manned and in the water to assist in the event of an incident during launching and also with recovery of the lifeboat
- all ship's personnel involved in the launch, whether as part of the lifeboat crew or onboard, should be thoroughly briefed prior to the launch
- any company-specific procedures with regard to the lifeboat crew and the wearing of PPE should be followed
- once all preparations are confirmed complete, the boat can be launched
- once the boat has been launched, the opportunity should be taken to inspect the rollers and/or skid plates that the boat rests on when housed, this should only be carried out if suitable access to the rollers/skids is available.



1. Locking pins to prevent accidental movement of release handle

Fig. 9 Boat release handle

Additional points for wire launching

- The frequency and conduct of free-fall lifeboat wire launches should comply with SOLAS or Flag State requirements, whichever are more stringent
- the manufacturer's guidelines for wire launching a free-fall lifeboat should be followed

- if suitable securing points are fitted to the lifeboat stern, suitable lines should be attached to them to assist in controlling the boat while it is being swung outboard
- the attachment points for lifeboat lifting strops should be inspected to ensure that the strops are securely attached to the lifeboat
- following launch of the lifeboat, personnel on the rescue boat will have to transfer to and from the lifeboat to re-connect the boat to the recovery mechanism. Personnel should be aware of the particular hazards associated with transferring between the craft.

Additional points for simulated launches

- Some lifeboat manufacturers do not provide a way of simulating launches. It is important that the specific manufacturer's handbook is checked and that guidelines are closely followed.
- methods of launch simulation will vary, possible even for boats built by the same manufacturer. It is therefore important that the specific guidance for the particular lifeboat is followed.
- the lifeboat safety chain, pin or recovery hook should not be used to facilitate simulated launches unless such use is identified as an approved method by the lifeboat manufacturer.

5.4 Recovery

- Where possible, the lifeboat should be recovered empty. The vessel's rescue boat should be utilised to remove the lifeboat crew once the recovery hook has been secured to the boat. The rescue boat can also be used to help the lifeboat manoeuvre into the correct position for the attachment of the recovery strops

- the lifeboat should only be recovered using strops, shackles and hooks that are specifically supplied for this purpose
- if securing points are fitted to the lifeboat, suitable lines should be attached to these points to assist in controlling the stern of the lifeboat during recovery
- depending on the type of release hook fitted to the lifeboat, it may be necessary to reset the hook prior to the boat being recovered. Reference should be made to the manufacturer's handbook regarding the need to reset and the process for doing so
- some manufacturers supply recovery strops that have a plastic covering. While this protects the lifeboat hull from becoming grease stained, it makes it very difficult to inspect the condition of the strops. If strops do have such a coating, it should be removed or, alternatively, split along its length so that the wire can be inspected in line with manufacturer's recommendations. The plastic coating then be replaced and bound back onto the wire.

5.5 Post recovery

- Once the lifeboat is recovered, the manufacturer's guidelines should be followed with regard to securing the boat. Once the boat is secured, the designated safety/maintenance chain, pin or hook should be attached so that the boat can be made ready for use without risk of inadvertent launching
- where possible, the lifeboat's drenching system should be flushed with fresh water to prevent a build up of salt deposits. If possible, the same should be carried out for the lifeboat engine
- the lifeboat should be left ready for immediate launch with safety/maintenance chains or pins removed.

Dedicated Rescue Boats

6.1 Maintenance and inspection

Reference should be made to the relevant recommendations contained in Section 2 regarding the inspection and maintenance of survival craft.

6.2 Familiarisation and training

Fig. 10 Rescue boat in stowed position

In addition to the recommendations contained in Section 3, the following have particular relevance for dedicated rescue boats:

- Prior to any practice launch and manoeuvring, a risk assessment should be carried out with regard to the significant hazards of the operation
- immediately prior to the operation, a toolbox talk should be carried out with the crewmembers involved
- consideration should be given to exercising the rescue boat and lifeboat together
- rescue boats should, as far as is reasonable and practical, be launched and manoeuvred in the water every month. In all cases this shall be done at least once every three months, in accordance with SOLAS requirements
- training should include, but not be limited to, specific practical drills to ensure competence in:
  - launching and recovery of the rescue boat
  - use of release hook (may be either simplex or duplex)
  - engine starting
  - picking up casualties from the sea
  - picking up persons from another craft (a lifeboat can be used for this exercise)
  - manoeuvring, including coming alongside a ship's gangway and other craft
  - use of recovery strops
- theoretical training should include the righting procedure of the rescue boat, if applicable
- a dedicated and alternate rescue boat crew should be familiar with its operation
- all crew members should be made familiar with the launching of the rescue boat.

If a fast rescue boat (FRB) is fitted on board, specific shore-based training is necessary, as required by the ship's Flag State.

6.3 Launching

- Personnel should be familiar with the specific boarding arrangements of the rescue boat
- painters should be fitted to the forward and after bollards to keep the rescue boat parallel with the shipside and should be slacked in a controlled manner when swinging out the davit arm
- as the boat is open, it is necessary in polar and temperate climates to wear an immersion suit when manning the rescue boat. However, in tropical climates there is a risk of heat exhaustion if immersion suits are worn
- personal floatation devices should be worn by the rescue boat crew
- prior to lowering, the boat crew should position themselves as close to the centreline of the rescue boat as is practicable to reduce the risk of being thrown overboard by any sudden movement of the boat. Safety harnesses attached to the boat should be used by the boat crew, if practicable
- communications between the ship and the rescue boat crew should be established and confirmed as satisfactory
- ensure that lashing strops (gripes) are released and checked clear prior to launching
- once the boat is swung out and clear of the vessel, the engine should be started
- where practicable, a preventer strop should be fitted between the fall and the boat in case of hook failure. This should be released when the boat is approx 1 metre above the water

- the crew member manning the brake should have a clear view of the rescue boat throughout the lowering and launching operations.

Manoeuvring

- The release hook and painters should only be released when the boat is waterborne
- the manoeuvring characteristics of a rescue boat are very different to those of the traditional lifeboat, particularly with regard to the immediate responsiveness and relative instability of the rescue boat

Fig. 11 Rescue boat

- safety harnesses should not be worn in the rescue boat when it is waterborne unless the boat has been specifically designed for their use
- additional fendering may be necessary when coming alongside other craft or gangways to prevent damage, especially if there is any sea or swell running.

6.4 Recovery

- Where possible, disembark able-bodied persons at the gangway, other than the rescue boat crew, prior to recovery. Casualties requiring special attention may be recovered with the boat
- the painter must be attached to the rescue boat prior to attaching the fall wire
- where necessary, reset the release hook prior to connecting
- consider using a recovery strop to facilitate re-connection
- once connected, raise the boat 1 metre clear of the water, re-check the hook and re-attach the preventer strop
- once satisfied all is correct, resume recovery
- while the boat is being recovered, the crew should re-attach safety harnesses to the boat, where practicable
- during recovery, the boat crew should position themselves as close to the centreline of the rescue boat as is practicable to reduce the risk of being thrown overboard by any sudden movement of the boat
- prior to swinging in the davit arm, painters should be fitted to the bollards
- personnel should disembark in accordance with the specific disembarkation arrangements.

6.5 Post recovery

- Once fully recovered, the rescue boat should be secured in accordance with manufacturer's instructions and left ready for immediate use
- where possible, the boat and engine should be washed down with fresh water.

Davit Launched Liferafts

7.1 Maintenance and inspection

Reference should be made to the relevant recommendations contained in Section 2 regarding the inspection and maintenance of davit launched survival craft.

7.2 Familiarisation and training

It is required under SOLAS that onboard training in the use of davit launched liferafts is undertaken at intervals of not more than 4 months. In addition to the recommendations contained in Section 3, the following have particular relevance for davit launched liferafts:

- Consideration should be given to the provision of a 'dedicated training davit launched liferaft'. This may then be made available onboard for practical hands-on training in launching the raft using the davits and for practicing boarding arrangements, if possible, with the raft swung inboard
- consider arranging for the inflation of a davit launched liferaft for practical training on the day prior to the scheduled annual servicing of the life rafts, in co-ordination with the liferaft servicing agent
- all crew can be given 'hands-on' training on the operation of the davit during routine drills by disconnecting the liferafts and attaching drums or jerry cans of water on them to simulate the raft.

Note: Davit launched liferafts are only required to be carried on ships that are designed to operate with a single lifeboat, for example, a free-fall lifeboat. The liferafts on at least one side of the ship shall be served by launching appliances.

Fig. 12 Off-load release hook for davit launched liferaft

7.3 Launching

Some vessels may be equipped with a common davit to launch the rescue boat and the liferafts. These davits have two separate hooks for lifting the rescue boat (on-load release) and the liferafts (off-load

Note: Davit launched liferafts are only required to be carried on ships that are designed to operate with a single lifeboat, for example, a free-fall lifeboat. The liferafts on at least one side of the ship shall be served by launching appliances.

release). The hooks must be properly marked and their use clearly understood by all personnel to avoid the wrong hook being used with the wrong type of equipment.

Before any drill is conducted using davit launched liferafts, the officer in charge should ensure that the following points are observed and complied with:

- During drills, the liferaft should be unmanned
- that no person or any obstruction will interfere with the launch path
- there is no vessel or any obstruction on the sea in the liferaft landing area
- that all involved crew are briefed of the procedures for the operation. The procedures and risk assessment for launching should be discussed with the involved crew via a 'toolbox' talk.

Liferafts should be lowered slowly and at a constant speed. Excessive contact with the ship's side may cause damage to the raft.

In an emergency situation, the liferaft will be manned before lowering. The bowsing line should be kept connected at all times while the liferaft is being boarded at the embarkation level. Boarding should be in a controlled and balanced manner in order not to de-stabilise the craft (see raft manufacturer's recommendations).

Note: Davit launched liferafts are only required to be carried on ships that are designed to operate with a single lifeboat, for example, a free-fall lifeboat. The liferafts on at least one side of the ship shall be served by launching appliances.

7.4 Recovery

During drills the hook will not be released from the unmanned raft, which should be winched back onboard once the lowering operation is complete.

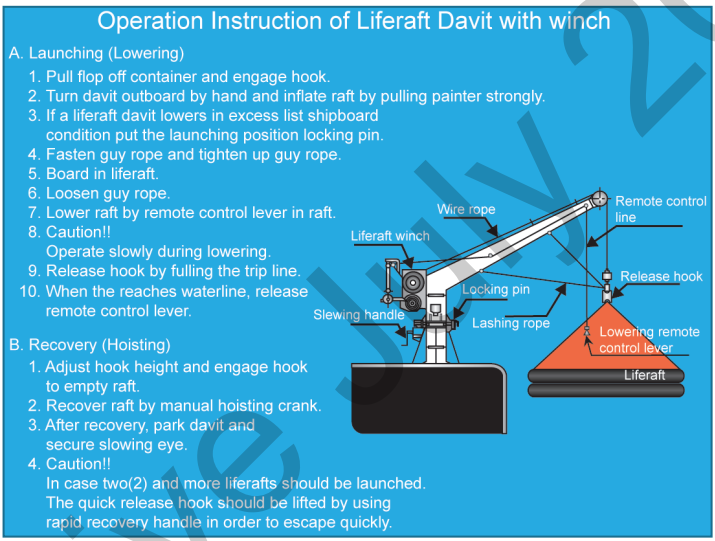


Fig. 13 Example operating instructions

Note: Davit launched liferafts are only required to be carried on ships that are designed to operate with a single lifeboat, for example, a free-fall lifeboat. The liferafts on at least one side of the ship shall be served by launching appliances.

Annex 1

Example Procedure for the Launching and Recovery of Davit Launched Lifeboats

Launching of davit launched lifeboat

The following is provided **purely as an example** of the procedure for the launching and recovery of davit launched lifeboats for possible reference when developing ship-specific procedures:

1. Pre-planning to include consideration of the following:
   (a) Voyage instructions/constraints
   (b) need to inform Port Authority
   (c) suitability of weather and sea conditions, both current and forecast
   (d) crew's recent hours of work in relation to forthcoming work commitments
   (e) vessel's current condition (loaded/ballasted)
   (f) need to ensure vessel is stopped
   (g) assigning personnel specified duties, as outlined within the rank-specific muster list. Ensuring delegated crew members are aware of their particular job function on launching and recovery, focusing on recent experience of the specific type of boat/davit in parallel to rank
   (h) disseminating relevant procedures, risk assessment and contingency plan.
2. Hold 'toolbox' meeting with crew encompassing the complete launching and recovery procedure.
3. Ensure safety pins are correctly fitted to prevent release hooks from opening.
4. Ensure supply of power for winch motor.

5. Make forward painter fast to bitts on deck.
6. Disconnect battery cable.
7. Secure boat plug.
8. Release and remove gripes.
9. Confirm davit harbour pins are clear/unlock harbour hooks.
10. Remove safety pins from brake levers and confirm manual crank handles are removed.
11. Lower the lifeboat to 1 metre above the water level with no-one inside.
12. Gauge the effect of sea conditions on the lifeboat and make a final decision to launch, based on observed boat movement.
13. Replace brake release lever safety pins.
14. Commence heaving the boat and manually test the operation of limit switches.
15. Hoist the boat all the way up until the limit switch cuts-in and hoisting stops.
16. Engage the manual crank handle and manually crank up the boat to its stowed position. Remove the crank handle.
17. Secure the gripes forward and aft to prevent boat movement when personnel embark.
18. Minimum boat crew to board the lifeboat wearing personal floatation devices (PFDs) and standard personal protective equipment (PPE).
19. Boat crew to close boat access doors; take allocated seats; fasten seat belts and, if fitted, shoulder straps and test communications.

    Note: depending on company-specific procedures, the lifeboat engine may be started at this point or when the boat is 1 metre above the waterline.

20. When the boat crew are secured inside the boat and have confirmed they are ready, release the gripes and stow them clear of obstructions.
21. Check the counter weight on remote releasing wire is clear on top of canopy. Check overside is all clear and check lifeboat is ready for release and personnel on deck are clear of danger.
22. Remove safety pin from brake lever and remote lowering lever.
22. Coxswain to lower the boat, using the remote control wire within the lifeboat in a steady controlled manner, until the boat is 1 metre above the water level.
23. Stop lowering when the boat is 1 metre above the water level; open fwd and aft hatches; remove safety pins from release hooks; start lifeboat engine (if not done at step 19); close fwd and aft hatches; ensure personnel return to their allocated seats and refasten seat belts and, if fitted, shoulder straps.
24. Resume lowering lifeboat to the water by using the remote control wire from within the lifeboat.
25. When the lifeboat is well in the water, the hydrostatic release will activate (as indicated by tell-tale) permitting manual release of the hook mechanism; activate hook disengaging lever, check hooks are disengaged; release painter (pick up painter from water); ensure remote control wire is clear; manoeuvre boat clear of the ship's side.
26. Test engine ahead and astern, check lifeboat sprinkler system.
27. Open forward and aft hatches; reset disengaging lever in helmsman control; reset cams forward and aft for re-engaging hooks. Onboard ship, replace the safety pins in brake levers.

Recovery of davit launched lifeboat

IMPORTANT: Prior to boat recovery, the officer in charge in the boat is to **personally** check that the release lever is properly reset and that the hooks forward **and** aft are locked, and report this confirmation to the Master.

1. Approach to align the lifeboat with forward and aft davit hooks and retrieve painter.
2. Engage hooks forward and aft (forward normally first, depending on sea and wind conditions at the time of the recovery).
3. Boat crew to return to allocated seats and strap themselves in.
4. Inform deck party to heave lifeboat to 1 metre above the water. Shut down lifeboat engine.
5. Stop heaving when lifeboat is 1 metre above the water. Check release gear; secure hook safety pins; officer in charge to recheck same; close hatches; return to allocated seats; fasten seat belts and, if fitted, shoulder straps.

IMPORTANT: Prior to boat being hoisted, the officer in charge in the boat is to **personally** check that the release lever is properly reset **and** that the hooks forward and aft are locked and report this confirmation to the Master.

6. Resume heaving and manually test the operation of limit switches.
7. Heave lifeboat to embarkation deck level until limit switch cuts-in and hoisting stops.
8. Manually crank up to align lifeboat to embarkation position; remove manual crank handle; engage harbour pins in davits; connect forward and aft gripes; disembark crew from boat.

9. Reconnect battery power supply cable; reconnect forward and aft painters; close all access doors; remove safety pins from lifeboat hooks; remove harbour pins.
10. Ensure that the lifeboat is in its proper stowed position with the weight of the boat taken by the davits and not on the falls.
11. Check that the lifeboat is in all respects ready for immediate launching in the event of an emergency.

Annex 2

Extract from an Example Risk Assessment

The following extract from a risk assessment is provided **purely as an example**. It depicts the significant risks associated with the launching and recovery of a davit launched boat and shows how the process may be used to identify control measures and assess their potential effectiveness.

Step No.	Description of task step	Hazard or Potential Incident	Who or what may be harmed	Severity	Likelihood	Risk
				Severity × Likelihood = Risk		
1	**Launching of Davit Launched Boat**	Weather, ambient temperature and/or sea conditions are excessive	Injury to crew Damage to boat Damage to davit	**5**	**5**	**25**
		Failure of communications	Injury to crew Damage to boat Damage to davit	**5**	**5**	**25**
		Failure to understand launching procedures by crew.	Injury to crew, Damage to boat, Damage to davit	**4**	**5**	**20**
		Equipment defect or failure	Injury to crew, Damage to boat, Damage to davit	**5**	**5**	**25**
		Uncontrolled lowering of the boat	Injury to crew, Damage to boat, Damage to davit	**5**	**5**	**25**

Control measures	Residual Severity	Residual Likelihood	Residual Risk	Action or Respon Party
Local weather forecasts should be obtained to ensure suitable conditions for the duration of the drill	3	2	6	Bridge Team
Visual inspection of the weather carried out prior to the drill				Master
The decision as to whether immersion suits are to be worn should be discussed and decided upon subject to ambient temperature, wind chill and sea temperature				Officer in Charge
Prior to drill ensure primary and secondary communication systems are established	5	2	10	Coxswain/Officer in Charge
Ensure any battery operated communication systems are fully charged, where possible ensure spare batteries are available				Officer in Charge
Ensure all communication is carried out in the working language of the vessel				Officer in Charge
Adequate training must be provided. All crew to wear appropriate PPE	2	2	4	Chief Officer
Procedure for launching to be clearly posted at the location of the launching area in a form that is understood by all the crew				Chief Officer
Tool box talk to be carried out prior to the operation, ensuring all crew know their assigned tasks				Officer in Charge
Maintenance/greasing/inspection of all associated equipment to be carried out as per manufacturer recommendations	3	2	6	Chief Engineer
Equipment to be serviced by an approved service agent in accordance with SOLAS requirements.				Ship's Superintendent
Ensure brakeman has a clear line of sight with the boat while lowering. Ensure brakeman is competent	3	2	6	Officer in Charge
Ensure communications are established prior to launch and test both primary and back up systems				Coxswain/Officer in Charge
Correct inspection and maintenance along with unmanned lowering to 1m above the water during drills to prove systems				Officer in Charge

Step No.	Description of task step	Hazard or Potential Incident	Who or what may be harmed	Severity	Likelihood	Risk
				Severity × Likelihood = Risk		
1	**Launching of Davit Launched Boat (cont'd)**	Hook premature release/failure/ seizure	Injury to crew damage to boat	**5**	**5**	**25**
2	**Recovery/Post-Recovery of Davit Launched Boat**	Injury from block/ hook during heavy weather recovery	Boat crew	**4**	**4**	**16**
		Hook fails during recovery	Boat crew	**5**	**4**	**20**
		Fall overside during recovery	Boat crew	**4**	**4**	**16**
		Damage to boat while stowed	Damage to boat	**3**	**5**	**15**

Control measures	Residual Severity	Residual Likelihood	Residual Risk	Action or Respon Party
Correct inspection and maintenance as per manufacturer's instructions along with pre-operation inspection	3	2	6	Chief Engineer
Correct training with regard to operation of the specific hook in use				Chief Officer
Use of maintenance/preventer strop until 1 m above water				Officer in Charge
Use of heavy weather recovery strop in adverse conditions	3	2	6	Officer in Charge
Training in boat handling and use of heavy weather recovery strop				Chief Officer
Check hook security and secure maintenance/ preventer strop from when boat is 1 m above water	5	2	10	Officer in Charge
Correct inspection and maintenance of equip-ment as per manufacturer's instructions				Chief Engineer
Prior to lifting ensure boat crew are seated and secured by seat belts	4	2	8	Coxswain
Good communication established with deck to ensure smooth lifting				Coxswain/Officer in Charge
Ensure boat is secured in accordance with manufacturers instructions	3	2	6	Officer in Charge
Prior to heavy weather ensure lashings are all correct				Chief Officer

Severity		Severity Definition	Likelihood	
			<Low(1)	Low (2)
			Not credible i.e. never heard of in the industry	Conceivable but would require multiple failures of systems and controls
Severity (consequences)	Negligible (1)	Negligible injury or health implications, no absence from work. Negligible loss of function/production with no damage to equipment or the environment.	1	2
	Low (2)	Minor injury requiring first aid treatment or headache, nausea, dizziness, mild rashes. Damage to equipment requiring minor remedial repair, loss of production or impact on the environment.	2	4
	Medium (3)	Event leading to a LTI, localised damage to equipment requiring extensive repair, significant loss of function/production or moderate pollution.	3	6
	High (4)	Involving a single death or severe injury. Damage to equipment resulting in function/production shutdown and significant production loss. Severe pollution with short term localised implications incurring significant restitution costs.	4	8
	Catastrophic (5)	Multiple deaths. Major pollution with long term implications and very high restitution costs.	5	10

1 - 6 - May be acceptable ; however, review task to see if it can be further reduced.

7 - 14 - Tasks should only proceed with the appropriate approval. Where possible, the task should be redefined to take account of the hazards involved or the risk should be reduced further prior to task commencement.

15 - 25 - Task must not proceed. It should be refined or further control measures put in place to reduce risk. The controls should be re-assessed for adequacy prior to task commencement.

Likelihood		
Medium (3)	>Medium (4)	High (5)
Less than average i.e. easy to postulate a scenario for accident but considered unlikely	More than average i.e. no direct knowledge but suspect that event may have occurred and represents a credible scenario	Likely to occur and evidence of a similar event occurring
3	4	5
6	8	10
9	12	15
12	16	20
15	20	25