

CHAPTER 18

STOWAGE AND LAUNCHING ARRANGEMENTS OF LIFEBOATS, RESCUE BOATS, INFLATED BOATS, LIFERAFTS AND BUOYANT APPARATUS

(See Chapter 9 for release gears which constitute an important element of overall launching arrangements)

18.1 Submission of plans

18.1.1 Plans showing the stowage of lifeboats, rescue boats, inflated boats, liferafts and buoyant apparatus and the lifeboat, rescue boat, inflated boat or liferaft launching arrangements should be submitted to the nearest Regional Marine Office by Owners or Builders for all new ships in classes covered by the Regulations.

18.1.2 In the case of passenger ships the plans should be examined by the Lead Surveyor in the first place to ascertain whether the proposed arrangements are in accordance with the Regulations and these Instructions. Any points of divergence should be discussed with the Owners or Builders concerned and eliminated as far as possible before the plans are sent to MCA for consideration. Reports and plans relating to methods of stowing and launching lifeboats, rescue boats, inflated boats, liferafts and buoyant apparatus together with those relating to the design and construction of davits, blocks and falls, winches and similar mechanisms should be sent to the Nominated Body. Surveyors should impress on Builders the desirability of submitting plans at an early stage in the construction of ships. These plans should indicate the proposed embarkation deck and mustering stations and should be submitted and accepted before the ladders and escape arrangements are considered.

18.1.3 In the case of non-passenger ships the plans should be examined by the Surveyors at the ports and any points of divergence discussed with the Owners, Builders or Manufacturers concerned.

18.1.4 The design of all davits, launching devices, winches and any other launching and recovery appliances should be acceptable to the Nominated or Notified Body and for such acceptance the makers should submit detailed drawings and calculations relating to the strength and stability of the appliances. This procedure should also be followed where appliances are provided to launch work boats or other boats which are additional to statutory requirements.

18.1.5 Designs of conventional davits launching appliances and winches for all ships should be dealt with locally. Designs or prototypes incorporating new principles, new materials or new methods of manufacturer not previously adopted

should be submitted with the relevant drawings and calculations to the Nominated or Notified Body.

18.1.6 The drawings should show the boat in the stowed position and in the full outreach position together with a curve indicating the path of the keel and/or bilge keel with the boat turning out against a 20 degree list. The drawings should also show the type, designation and position of winches if fitted, together with the arrangement of chains, blocks, griping, tricing and bowsing lines and the position of limit switches, where fitted, recovery arrangements if the boat is a rescue boat and any arrangements provided to lock the davit arms. The following details should also be included:

- the weight of the fully equipped boat,
- the number of persons for which the boat is certified,
- the total davit load,
- the position of the centre of gravity of the fully equipped boat,
- the weight and position of the centre of gravity of the davit arm,
- the value of the turning out moment on gravity davits,
- the outreach of the davit measured from a specified point such as the centre, of a pivot pin or side of trackways,
- the type of falls with dimensions and breaking load,
- the total length of falls,
- the type of chain, giving dimensions and guaranteed minimum breaking load,
- and material of construction.

18.1.7 If other plans indicate arrangements complying in all respects with the requirements of the Regulations and these instructions, the Builders should be informed at once to that effect in writing by the surveyor; they need not be sent to MCA until the ship is completed, when they should be sent with a full report together with certificates relating to the lifeboats, davits, etc., to be kept with the other records of the ships. If the surveyor is in any doubt as to the arrangements or if any difficulty arises in securing compliance with the requirements, he should, in the first instance, consult the Regional Manager who will, if necessary, refer the plans and the surveyor's report to MCA.

18.2 Design calculations

18.2.1 General

18.2.1.1 The statutory requirements as to the strength under conditions of list and trim of launching appliances, blocks, falls and other boat launching and securing gear and liferaft launching gear are contained in Schedule 6, Part 2, paragraph 3, Part 3, paragraph 2 and Part 4, paragraph 3 of MSN 1676(M) as appropriate. (See paragraphs 18.3.4 and 18.3.5 for guidance on strength of gripes, bowsing and tricing wires.)

18.2.1.2 When a lifeboat is also designated as a rescue boat particular attention is drawn to Regulations 55(4) and 76(1)(c) and Schedule 6, Part I, paragraphs 3.7 to 3.9 because the davits and winches or other means of launching should be capable of hoisting the boat to a disembarkation position at a rate of not less than 0.3 metre per second when loaded with its full rescue boat complement, or 6 persons whichever is the greater, plus its full lifeboat equipment. Also for safe and rapid recovery of the rescue boat in a seaway, safe and rapid engagement of recovery strops to the lifting hooks of the boat should be possible by the rescue crew.

18.2.1.3 The design parameters for equipment fitted on ships built before 1st July 1986 can be found in Schedules 10 and 11 of MSN 1677(M).

18.2.1.4 The design calculations to be submitted should be based on the most unfavourable load conditions for the range of list and trim specified in the Regulations and the combined stresses in the different sections of the strength members should result in a factor of safety of at least 4.5, based on the ultimate tensile strength for the materials used. Where davits and launching devices are of welded steel construction, the thickness of plates and steel sections used in arms and stand frames should not be less than 6 mm and should be fabricated under suitable conditions using electrodes appropriate for the type of steel used.

18.2.1.5 The davits should be adequately protected against corrosion and hollow sections hermetically sealed.

18.2.1.6 The makers should provide evidence as to the quality of the materials used.

18.2.1.7 In order to assess the working load of the winch and falls the designer's calculations should indicate the peak load which occurs in the system of falls, and at what stage of launching or recovery this load occurs. In assessing the stowing load it is usual to assume an efficiency of 95% for each sheave and 90% for the pivot pin or trackway rollers.

18.2.2 Working load

18.2.2.1 This is defined in MSN 1676(M) in the following paragraphs in Schedule 6:-

Lifeboats and rescue boats	Paragraph 1.2 of Part 2
Liferafts	Paragraph 1.2 of Part 3
Inflated boats	Paragraph 1.2 of Part 4

It is defined in the MSN 1677(M) in the following sections:-

Lifeboats	Schedule 10 Part 1
Inflated boats	Schedule 11 Para 1

18.2.2.2 The working loads defined in the MSN 1676(M) differ from those in the MSN 1677(M) with respect to the quantity of fuel to be allowed in the case of inflated boats. Originally required to allow for 3 hours engine operation this is now reduced in MSN 1676(M) to 2 hours.

18.2.2.3 Detail structural drawings and calculations should be submitted to show that the stress produced by this working load at the maximum list and trim conditions at any section of the structure has a factor of safety of 4.5 based on the ultimate tensile strength of the materials used. In addition the structure has to undergo the static and dynamic load tests as specified in the regulations without any permanent deformation or yielding of the materials used.

18.2.2.4 Where recovery strops and hanging-off pendants are used for compliance with the Regulations the pendant lug or attachment should be designed for 2.2 times the maximum load on the lug or attachment. Horns or tusks fitted to gravity davits and the corresponding part of the lower block should be designed for 2.2 times the maximum load to be supported by them. The maximum angle of adverse list up to which the block leaves the horn should be checked and this should be more than 20° but should not normally exceed 30°.

18.2.2.5 The effect of friction need only be included in any calculation where it has an adverse effect on strength or stability and beneficial effects should normally be ignored.

18.3 Stowage and handling

18.3.1 General

18.3.1.1 The statutory requirements are contained in Regulations 27 - 31, 49 - 53, 55 and 70 - 74 and 76 of the Merchant Shipping (Life-Saving Appliances for Ships Other Than Ships of Classes III to VI(A)) Regulations 1999, Regulation 12 and 14 - 16 of the Merchant Shipping (Life-Saving Appliances for Passenger Ships of Classes III to VI(A)) Regulations 1999.

18.3.1.2 All lifeboats should be stowed so that they can be swung out over the curtain plate, rail or bulwark without having to be lifted. Bilge keels must be clear of all obstructions when the lifeboat is swung out under conditions of adverse list and trim.

18.3.1.3 Boat falls should be kept attached to the davits and to the lifting hooks of the boats; they should be properly rove and led to lowering bollards, winches or other lowering devices in such a manner that they are immediately available for launching the boats. Davits for handling a boat forming part of the statutory Life-Saving equipment should in all cases be used solely for handling that boat.

18.3.2 Boat deck layout

In arranging the boat deck layout care should be taken to provide not only sufficient stowage space for all lifeboats, liferafts and buoyant apparatus required, but also sufficient working space for turning out the boats expeditiously on either side of the ship and for controlling the lowering of the lifeboats.

18.3.3 Boat chocks and other supports

18.3.3.1 In all ships the lifeboats, when in the stowed position, should be properly supported. Where gravity davits are fitted, keel supports and side support pads should be incorporated in the davits arms. Where other davits or launching appliances are provided the lifeboat or boat should be properly supported by chocks resting upon skids securely fastened to the deck or boat platform.

18.3.3.2 Chocks and other supports should be of simple construction, properly formed to suit the shape of the lifeboat, and so fitted that the lifeboat can be put overboard without being lifted. To this end the upper surface of the keel supports should be stepped 75 mm at the side of the boat's keel, and the chocks hinged as necessary so that when turned down they fall below the boat's keel.

18.3.3.3 Chocks and side pads for GRP lifeboats should be of sufficient area to prevent distortion of the hull laminate and be suitably covered. When wood boats are stowed in davits other than gravity davits, chocks should be fitted at a quarter of the boat's length from each end and on each side of the keel to support properly the bilges of the boat and prevent sagging and straining. For lifeboats over 7.30 metres in length, if the chocks are not fitted at quarter length, the keel should be supported at the mid-length of the lifeboat, or alternatively suitable additional stiffening should be fitted to the lifeboat to the surveyor's satisfaction. Where mid-length keel supports are fitted, they should be so constructed as not to interfere with the turning out of the lifeboat or boat. In the case of GRP, steel and aluminium lifeboats chocks may be accepted on one side of the keel only unless the surveyor considers that for safe working chocks are required on both sides.

18.3.3.4 To enable the lifeboats to be quickly turned out with the minimum of risk to those engaged in the operation, the outboard chocks and gripes should be so fitted and arranged that they can be quickly released without it being necessary for a man to go to the outboard side of the boat. The hinges, slides and joints of chocks should be kept free of paint to prevent the chocks from becoming set fast, and the hinges kept well lubricated. Where, in the case of patent chocks, pins have to be removed, the pins should be of non-corrodible metal, attached to the chocks by jack chains, and they should have drop-nosed points so that they can be easily withdrawn by hand without the use of tools.

18.3.4 Gripes and lashings

18.3.4.1 When lifeboats are stowed they should be secured by gripes which should have adequate strength. Considering rolling and pitching the maximum load on the gripes may be taken as half the weight of the boat without persons and the griping system should have a safety factor of at least 4.5. The gripes should be capable of easy and quick removal from inboard. The chafing plates should properly fit the gunwale and the gripes should be fitted with slip links of suitable design for ready release and with hemp lashings for cutting in an emergency. The gripes should be fitted as near to the chocks as possible to prevent the boat from being unduly strained and should be secured to eyebolts or rings fitted in suitable positions. The slip links and lashings should be readily accessible. On glass-reinforced plastic lifeboats and aluminium alloy boats the gripe and skate wires should be suitably covered and the use of plastic or rubber tubing is recommended. Keel and davit chocks and the gunwale chafing plates for the gripe wires and skates should also be covered by a suitable material unless satisfactory alternative protection is permanently attached to the lifeboat in way of these items.

18.3.4.2 A special type of lifeboat griping system employed in connection with certain gravity davits is arranged so that when the davit arm starts to move outwards it releases a catch and thus automatically frees the gripes. In this particular system the rope lashings are omitted and a long-tailed slip is used instead, thus maintaining two means of release. The long-tailed slip may have a light lashing at the toe. Should the automatic system for any reason fail to operate, the long-tailed slip link can easily be slipped even under a load on the griping wire. Long diagonal gripe wires which extend from davit to davit should not be used as this arrangement can impose an undue strain on the structure of the lifeboat.

18.3.4.3 In some griping systems the gripes are in two parts connected to a special fitting on the gunwale. Surveyors should ensure that there will be no danger of the lower gripe wire fouling the propeller of a motor lifeboat when the gripes are released.

18.3.5 Bowsing and tricing arrangements

18.3.5.1 The general statutory requirements are in Regulations 28(15), 50(8), 50(9) and 71(8) and 71(9) of the Merchant Shipping (Life-Saving Appliances for Ships Other Than Ships of Classes III to VI(A)) Regulations 1999.

18.3.5.2 Surveyors should satisfy themselves that suitable means, independent of the davit turning out gear and having regard to the size and weight of the loaded boats, are provided for keeping the lifeboats close to ship's side while the passengers are embarking and then releasing them under control when they are loaded preparatory to lowering. Where luffing davits are installed bowsing arrangements should be fitted, and where gravity davits are installed bowsing and tricing arrangements should be fitted.

18.3.5.3 Surveyors should ensure that gunwale fittings of lifeboat are not sited abreast the lifting hooks to avoid the possibility of tricing pendants catching up in fairleads, cleats or bollards. Such an occurrence could be dangerous or could cause serious delay in an emergency since the lifeboat may need to be lifted in order to clear the fouled wire.

18.3.5.4 The tricing pendant should only be used to bring the lifeboat into the ship's side when it has been lowered from the stowed position to the embarkation position. When the lifeboat is at the embarkation position the bowsing line or tackle should be fitted and secured and the tricing pendant slipped before boat embarkation commences. A hemp lashing should be provided at the bottom end of the tricing pendant and should be within reach of a man in the boat for cutting in emergency. Considering list and trim and the weight of 2 crew members to prepare the boat for embarkation the maximum working load of the tricing system should be taken as 1.2 times the weight of the light boat without persons and the system should have a safety factor of at least 4.5.

18.3.5.5 After the full complement of the lifeboat has embarked, the lifeboat should be eased out from the ship's side, preferably from inside the boat, by the bowsing lines or tackles to the plumb position for lowering. At the express wish of the master of a ship, this operation may be permitted from the deck of the ship in which case, for strength and stability, the lifeboat end of the bowsing tackles should be attached inside the boat to the special eye provided on the lower block.

18.3.5.6 The maximum working load on each bowsing line or tackle may, for all practical purposes, be taken as $\frac{2}{5}$ the weight of the fully laden boat when the ship has a low side list of 20° ; the bowsing lines or tackles should be of sufficient length to control the boats until they are plumbed beneath the davit heads with the ship similarly listed. Bowsing blocks should have a minimum safety factor of 4.5.

18.3.5.7 Ropes used in bowsing lines or tackles should be of manila of good quality, or synthetic rope of equivalent strength, durability and grip which complies with a relevant BS EN standard (Appendix O). The property of grip is essential and the property of stretch should be minimal in this application.

18.3.5.8 The following table indicates the size of bowsing lines or tackles that might be accepted by gravity davits having a normal out-reach giving a clearance between the ship's side and the side of the lifeboat of not more than 457 mm. The bowsing arrangements will need special consideration when this distance is exceeded.

Weight of boats fully laden	Tackle purchases	Size of rope (diam)	
		Manila	Synthetic
Under 10 tonnes	Two to one (luff) tackle	30 mm	24 mm
10 tonnes and under 12 tonnes	Two fold tackle	28 mm	24 mm
12 tonnes and under 15 tonnes	Three to two (gyn) tackle	28 mm	24 mm
15 tonnes up to max of 20 tonnes	Three to three tackle	28 mm	24 mm

Where tackles are used the blocks should be provided with hooks so that they may be placed in position and removed without delay.

In addition to the rope and tackle bousing systems mentioned above the MCA has accepted tailor made winch bousing systems with wire rope for large lifeboats. Such special systems are dealt with on individual basis with detail calculations of structural stresses and prototype tests. Manufacturers should contact the nearest Regional Marine Office for approval of such specialised system for any particular ship.

18.3.6 Stowage arrangements on ships (except sailing ships) fitted with launching devices other than davits

18.3.6.1 Where any ship is fitted with a launching device other than a conventional davit, the launching arrangements should not necessitate the use of mechanical power.

18.3.6.2 The strength and test requirements for such devices should be similar to those for davits and in addition the following conditions should be met:

(i) If the boat is stowed at or near the middle line of the ship the bulwarks at the launching position should be kept free from obstructions likely to interfere with the launching or to damage the boat during launching.

(ii) The boat should be provided with a painter at each end and is to be kept attached to the launching device and ready for service at all times. If a derrick is used for this purpose the use of long heavy booms should be avoided. Permanent and efficient guys should be attached to the derrick and cleats fitted in suitable positions for belaying the derrick guys when the

boat is being swung outboard. The topping lift lead block is to be properly attached to the eye on the mast by a suitable ring, long link, or other effective device, adapted for allowing the shackle attached to the block to adjust itself in the direct line of the topping lead.

(iii) To prevent excessive stresses on the structure of the boat the bridle slings should be of such length that the angle between the legs when the boat is supported does not exceed 120°.

(iv) The height of the boat when stowed should normally be sufficient to enable it to be swung out over the rail or bulwarks without it being necessary to lift it or to top the device, but special consideration should be given where these arrangements are impracticable.

(v) The boat should be properly stowed in chocks and efficiently supported and gripped on skids or beams well secured to the ship's structure. If it is stowed over the hatchway no part of the weight should be borne on hatch covers. If portable stanchions are fitted to the hatch coamings to support the skids, they should be secured in their sockets by drop-nosed pins or by other equally efficient means.

18.3.6.3 The surveyor should witness a launching test and record the time taken in putting the boat out by hand, and personally satisfy himself of the efficiency of the whole arrangements. The number of men employed should not be greater than that of the crew of the ship.

18.3.7 Stowage arrangements on sailing ships fitted with launching devices other than davits

When, in the opinion of the surveyor, it is impracticable to fit the davits or launching devices required by the Regulations full particulars of the case with sketches should be submitted to MSPP2 together with a report on the suggested alternative. If it is impracticable to adopt a derrick arrangement similar to that set out in paragraph 18.3.6, boats may be launched by means of mast head pendants and tackles subject to the following:

- The pendants and tackles should be maintained in their proper position ready for service at all times.
- If the boat is stowed over a hatchway, no part of the weight should be borne on hatch covers.
- A test in putting the boat out should be carried out in conditions similar to those likely to be experienced in service.

18.3.8 Fendering

Where it is necessary to lower survival craft past openings between bulwark or rails and the deck above or past overhanging decks, satisfactory arrangements should be made by the provision of fending bars, or other equally effective means, to prevent the craft from lodging on the rail or being damaged, or the passengers from being injured owing to the craft swinging under the overhang when the ship is listed.

18.3.9 Boat platforms

18.3.9.1 Where lifeboats are stowed on platforms, the structure and connections should be of ample strength and rigidity having regard to the loads imposed by the davits. Platforms should extend to the ship's side and the length fore and aft should be at least the length of the boat plus 760 mm.

18.3.9.2 Platforms are to be so fitted as to provide a good foothold for persons handling the falls or operating the winches, and easy access at one end to the outboard side of the boats.

18.3.9.3 If the platforms are sparred, the planks, which should be laid fore and aft, should be not less than 65 mm thick, and not more than 50 mm apart. All platforms should be fitted with a stop-foot batten, 50 mm wide and 75 mm thick at the outer edge for the whole length of each boat.

18.3.9.4 Satisfactory arrangements should be provided to prevent persons, particularly children, from falling overboard through spaces in the vicinity of the lifeboats in the stowed position, e.g. between the lifeboats and davits or, underneath the lifeboats where they are stowed sufficiently high above the deck.

18.3.10 Stowage of buoyant apparatus

18.3.10.1 Buoyant apparatus should be distributed in suitable positions about the ship from which it may be readily launched and float free.

18.3.10.2 Buoyant apparatus should not be secured to the deck unless HRUs are incorporated in the lashings. They may be stowed in tiers one appliance above the other, but the units should, in that case, be kept apart sufficiently to prevent any possibility of their being stuck together by paint or varnish by hard wood distance pieces. There should be not more than five units of apparatus in the any one tier. Means should be provided, in the form of cants fastened to the deck or some other equally efficient arrangements, to prevent buoyant apparatus from sliding across the deck, in the event of the ship taking a list, or moving forward or aft if the ship takes a heavy trim by the bow or stern. Buoyant apparatus which is stowed in tiers should also be fitted with dowels and sockets or some other efficient means for preventing apparatus in an upper tier from sliding off.

18.3.10.3 Care should be taken that the buoyant apparatus is stowed in such a manner that the grab lines and floats are not liable to be damaged or to deteriorate and that the apparatus receives adequate ventilation. Buoyant apparatus constructed of plastic and/or plastic foam materials, e.g. polyurethane, GRP, ABS, etc. should be stowed in positions away from excessive heat, funnel deposits and sparks.

18.4 Embarkation arrangements

18.4.1 Embarkation deck layout

18.4.1.1 Adequate area must be provided for the marshalling and control of passengers and for the movement of the crew in carrying out their assigned duties. Passengers must be able to embark the lifeboats rapidly and in good order.

18.4.1.2 In ships of Classes I, II and II(A) proper arrangements should be made for embarking the passengers through gateways in the side rails or bulwarks into the lifeboats rapidly and in good order. Such gateways should open inwards and be not less than 1.25 metres in width. In exceptional cases, where it is impracticable to provide embarkation gateways and acceptance is given for ladders over the bulwark rails and passengers normally have access to the embarkation deck, the ladders must not be permanently fixed in position unless a temporary rail or barrier is fitted. This is for protection against the danger arising from children climbing them or passengers using them with a view of sitting on the bulwark rail during the course of the voyage. Portable ladders should be stowed as close to the embarkation station as possible.

18.4.1.3 In ships of Classes other than I, II and II(A), surveyors should satisfy themselves that embarkation into the lifeboats is readily practicable.

18.4.1.4 Arrangements shall be such that whether the lifeboats and rescue boats are boarded in the stowed position or the embarkation deck, the winch operator shall be able to observe the boat at all times during its launching and recovery.

18.4.2 Lifeboat embarkation positions

18.4.2.1 In some very large ships with inset superstructures the lifeboats are so positioned that it is necessary for the boats to be lowered to the upper deck level before embarkation. Before any such arrangements can be accepted the ship should have sufficient freeboard in the full load condition to prevent the possibility of a large wave unshipping the lifeboat from the hooks, either fully or at one end only, during embarkation. In such cases the surveyor should discuss the arrangements for the Life-Saving Appliances with the shipbuilder at an early stage to achieve satisfactory boat embarkation positions.

18.4.2.2 To provide satisfactory embarkation positions in ships of this type it may be necessary to build platforms extending to the ship's side at a level above that of the upper deck to permit embarkation at the higher level. Where the surveyor is in any doubt as to the proposed arrangements the case should be submitted to MSPP2.

18.4.2.3 It is also pointed out that the arrangements should include satisfactory fending arrangements to ensure that the boat clears the upper deck when being lowered.

18.4.3 Clearance between ship's side and boats when being lowered

The overhang of davits should be such as to ensure, when the ship is upright, a minimum clearance in lowering of 300 mm between the ship's side and that of the boat, this clearance being measured from the permanent structure of the lifeboat at its widest part irrespective of the skate. Where skates are fitted there should be a clearance of at least 75 mm between the ship's side and outer edge of the skate. When beltings or heavy rubbers are fitted to the ship's side, the clearance between the boat and the belting should not be less than 150 mm, and two tapered chocks or fending bars should be fitted on the upper and lower sides of the belting in way of the midship half length of each boat to fend the boat off when being lowered and to prevent the gunwale from being caught underneath the belting when the ship rolls. See paragraph 18.3.8 with reference to overhanging decks.

18.4.4 Projections on ship's side below boat positions

18.4.4.1 As projections on a ship's side below boat positions are a source of great danger to boats when being lowered, surveyors should pay special attention to all side fittings in way of boat positions to see that projections are reduced to a minimum, or that such modifications in the fittings are made as will render dangerous projections unnecessary.

18.4.4.2 Side scuttles which pivot on a vertical axis should not be fitted under boat positions unless they are specially devised and arranged to obviate the danger referred to, and are accepted by the MCA. Rigols or eyebrows should be made as small as possible, and gangway, cargo doors, and discharges from scuppers and soil pipes should be designed without dangerous lugs, hinges or other projections likely to foul or damage the boats when being lowered (see paragraph 18.4.3).

18.4.4.3 In all cases, particulars of such projections should be shown on the boat stowage plan.

18.4.5 Skates

18.4.5.1 The primary purpose of skates is to enable a lifeboat when being launched to override projections on the side of a listed ship. Skates should be made sufficiently strong to withstand bumping under sea conditions without suffering serious and troublesome distortion and at the same time they should not be unduly heavy so as to facilitate their ready removal when the lifeboat is waterborne.

18.4.5.2 Skates may be manufactured of steel, aluminium alloy or glass-reinforced plastic. In general the upper end of the skate should be designed to fit over the gunwale where it may be held in position by means of a screw fitting or clamp over a pad or plate on the gunwale in the case of a partially enclosed lifeboat or by any other equally effective means. The skate should be curved to the shape of the lifeboat and suitable wooden chocks may be secured to the inside of the skate to act as bearers against the side of the lifeboat. The lower end of the skate should be held in place at the keel by a claw, clip, spigot or similar means of attachment. No objection need be raised to an arrangement whereby the lower end of the skate extends just beyond the keel and is held tightly to the boat by means of a served wire rope, fixed on to the lower end of the skate and attached to the outboard gunwale by means of a suitable turnbuckle. Arrangements which involve the fitting of a wire or chain across the boat from gunwale to gunwale are not acceptable.

18.4.5.3 If wood bearing chocks are fitted to the skate they should be not less than 100 mm in width and if the skate is intended for service with an aluminium alloy lifeboat the chocks should not be of oak. Particular care should be taken to avoid contact between dissimilar metals when ordering skates for a particular type of lifeboat, in general all screwed fittings, locking pins etc. for securing the skate to the gunwale should be of non-ferrous metal, e.g. brass.

18.4.5.4 Before a particular design of skate can be accepted the following procedure should be adopted:

- (i) Plans showing particulars of the scantlings, materials and details of the securing and release arrangements at the gunwale and keel should be forwarded to the Nominated or Notified Body.
- (ii) Full scale tests should be carried out with the skates fitted to an actual lifeboat and lowered down a ship's side or a structure simulating a ship's side, including bumping and surge tests, and tests on an inclined plane as may be considered necessary.
- (iii) It should be demonstrated that the skates can be readily detached by a person inside the lifeboat.
- (iv) The above tests should be witnessed by a surveyor.

18.4.5.5 When launching for boat drill the skates should be securely attached to the lifeboat by means of a lanyard so that if they are unshipped they will not be lost.

18.4.5.6 In some types of totally enclosed lifeboats it is not practicable to fit skates of conventional type, and in these cases no objection need be raised to the fitting of fixed type skates to the side of the lifeboat. Full particulars, however, should be submitted to the Nominated Body for acceptance.

18.4.6 Glass windows in ship's side underneath boat stowage positions

Where the spaces allocated for marshalling passengers in an emergency have large glass windows at the ship's side and such windows are directly below the lifeboats, the glass should be protected or other suitable arrangements made to avoid the risk of the passengers being injured by broken glass when the lifeboats are being lowered.

18.4.7 Boat and liferaft positions in relation to pump discharges

18.4.7.1 The requirements are specified in Regulation 53(9) and 74(9) of the Merchant Shipping (Life-Saving Appliances for Ships Other Than Ships of Classes III to VI(A)) Regulations 1999 and Regulation 15(3) of the Merchant Shipping (Life-Saving Appliances for Passenger Ships of Classes III to VI(A)) Regulations 1999. When the orifices of pump discharges are near to or below the position of the lightest sea-going waterline or where the pumps are used in connection with the main propelling machinery and are out of action when the engines are stopped, no objection need be raised to the stowage of boats abreast such discharges. The lightest sea-going waterline should take into account the least favourable conditions of list and trim under which the lifeboat or liferaft is required to be launched.

18.4.7.2 When, however, the discharge orifices of independent pumps which are likely to be discharging under emergency conditions are situated higher up the ship's side, either means should be provided for stopping the pumps from positions outside the engine room, or other satisfactory precautions should be taken to ensure that when the boats are lowered there is no danger of their being swamped by water from the discharges. The positions of pump discharges, and particulars of the pumps to which they are connected, should be indicated on the plans of boat stowage when these are submitted for acceptance. Surveyors should take every opportunity of emphasising that special care is needed to ensure that all the emergency controls so fitted are kept in efficient working order, and that their positions are known to the deck officers in addition to the engineer officers of the ships. The location of the emergency controls should be indicated on the ship's 'safety plan' which may be the 'fire control' plan required by Regulation 49 of the Merchant Shipping (Fire Protection: Large Ships) Regulations 1998 (SI 1998 No. 1012).

18.4.8 Embarkation ladders

18.4.8.1 *General*

Statutory requirements for embarkation ladders are given in Regulation 30(3), 50(7) and 71(7) of the Merchant Shipping (Life-Saving Appliances for Ships Other Than Ships of Classes III to VI(A)) Regulations 1999 and Schedule 6, Part 5 of MSN 1676(M) as appropriate and Regulation 13 of the Merchant Shipping (Life-Saving Appliances for Passenger Ships of Classes III to VI(A)) Regulations 1999.

18.4.8.2 *Construction*

(i) The treads of side ladders should be of hardwood or other material of an accepted type not less than 480 mm long, 115 mm wide and 25 mm in depth, spaced not less than 300 mm nor more than 380 mm apart and secured in such a manner that they will remain horizontal. Treads of three-string ladders should be not less than 1370 mm long, 115 mm wide and 25 mm in depth, similarly spaced and secured.

(ii) The side ropes of the ladder, and the centre ropes in the three-string ladders, should consist of two parts of uncoiled 20 mm diameter good quality manila rope or synthetic rope of equivalent strength, durability and grip complying with the relevant BS EN standards (see Appendix O). The property of grip is necessary in this application and surveyors should ensure that suitable rope is used. See also Appendix O - "Natural and synthetic fibre cordage for Life-Saving Appliances".

(iii) In view of the serious risk to life involved if side ladders fail in service; surveyors should be satisfied that the materials and workmanship are of satisfactory quality, and that the ladders are in all respects fit for the service intended.

18.4.8.3 *Stowage*

(i) Side ladders should be so stowed as to be readily available for use in embarking persons into lifeboats or liferafts.

(ii) In passenger ships the ladders should be stowed at the embarkation decks. In cases where there may be difficulty in securing satisfactory compliance with the requirements of Regulations 50(7) and 71(7) of the 1999 Regulations owing to overhanging decks or other structural arrangements the surveyor should, if in doubt, submit details of the proposed arrangements to MSPP2.

(iii) In non-passenger ships the ladders should generally be secured to eyeplates on the boat deck but other arrangements which the surveyor considers satisfactory can be accepted.

(iv) Adequate hand holds to allow persons to pass from the deck to the ladder in safety should be provided in all cases.

(v) It is desirable that side ladders should be stowed on platforms or bearers to guard against the possibility of the roping lying in water for long periods. This is particularly important where ladders are stowed on wooden decks which are cleaned with preparation of a corrosive nature.

18.4.9 Mechanical descent units

18.4.9.1 In certain ships to which Regulations 50(7) and 71(7) of the Merchant Shipping (Life-Saving Appliances for Ships Other Than Ships of Classes III to VI(A)) Regulations 1999 apply, as an alternative to fitting side ladders for embarkation into each lifeboat, mechanical means of lowering persons down the ship's side are acceptable provided that there is at least one side ladder on each side of such ships.

18.4.9.2 Where only one side ladder is provided on each side of the ship they should be placed near to the rescue lifeboats.

18.4.9.3 Mechanical descent units should be of a design acceptable to the MCA and for such acceptance fully detailed design arrangements and calculations should be submitted to the Nominated Body. The design should incorporate automatic control of speed of descent to a maximum of 2 metres/second, and automatic recovery of the harness or platform to the embarkation point to permit successive descents. In addition means to arrest the descent should be provided taking account of the variation in freeboard which may be expected. Acceptance of a prototype design is subject to an extended series of test descents with a prototype unit. The working load of the unit should be taken as 91 kg and a factor of safety of 6 based on the ultimate tensile strength of the materials used should generally be achieved. It should be possible for an incapacitated person to be lowered by the unit.

18.4.9.4 Acceptance of subsequent units is subject to satisfactory test before despatch from the manufacturers to a static load test of 2.2 times the working load and a lowering test of 1.5 times the working load, and to a lowering test after installation on board of 1.1 times the working load. Particulars of the workshop test and the date of test should be clearly and durably marked on the unit. The manufacturers should provide two certified material tests for each 300 m of the lowering rope and such ropes should be of sufficient length to reach the water with the ship in the lightest service condition and with an adverse list of 20 degrees. The lowering test of 1.1 times the working load is to be repeated at about six monthly intervals by the ship's personnel and noted in the ship's logbook.

18.5 Launching appliances for lifeboats, rescue boats, other boats and liferafts

18.5.1 General

18.5.1.1 Launching appliances must be fitted in accordance with the Regulations for the various classes of ships. The general requirements for such appliances and their associated winches are specified in Schedule 6, Part 1, of MSN 1676(M) and in Schedules 5, 10 and 11 of MSN 1677(M).

18.5.1.2 In MSN 1676(M) the following parts of Schedule 6 apply.

Lifeboats and Rescue boats	Parts 1 & 2
Inflated Boats	Parts 1 & 4
Liferafts	Parts 1 & 3

18.5.1.3 In Volume 2 - Testing of Life-Saving Appliances the following parts of Chapter 6 apply.

Lifeboats and Rescue boats	Part I
Liferafts	Part II
Inflated Boats	Part III

18.5.1.4 In the MSN 1677(M) the following Schedules apply

Lifeboats	Schedule 10
Inflated Boats	Schedule 11
Liferafts	Schedule 5

18.5.1.5 Other launching devices may be fitted in ships in which mechanically controlled single arm davits, luffing or gravity davits are not required by the Regulations provided that the devices meet the requirements of the above Schedules where applicable.

18.5.1.6 Davits, launching devices, (i.e.: appliances other than davits) and liferaft launching appliances should not rely for their operation on any effort other than that provided manually or by the force of gravity or by mechanical power independent of the ship's main power supplies. However use of ship's power additionally is not prohibited and certain uses of power have been considered as equivalent to requirements after careful consideration of the design by the MCA.

18.5.2 Luffing davits

The statutory requirements for luffing davits are contained in Schedule 6, Part 2, paragraph 5 of MSN 1676(M) and Schedule 10, Part 2, paragraph 3 of MSN 1677(M).

18.5.3 Gravity davits

18.5.3.1 Gravity davits are required to be so designed that there is a positive turning out moment during the whole of the davit travel from the inboard stowed position to the outboard position under the conditions of list and trim specified in the Regulations, and for this purpose the turning out load of the boat should be taken as the weight of the boat with the addition of the equipment required by the Regulations, but excluding the launching crew. Where the turning out moment could be reduced by deterioration in the action of any part of the davit, special consideration should be given to the type of material used and to its surface protection and lubrication.

18.5.3.2 In the case of new designs, or in cases having a marginal positive turning out moment, the Nominated or Notified Body may call for samples of such davits to be tested on a platform capable of simulating various conditions of list and trim up to 30 degrees and 10 degrees respectively either way to demonstrate that this necessary condition is fulfilled. For such tests the davit should be rigged to simulate the shipboard condition but account need not be taken of the load required to overcome the frictional resistance within the winch.

18.5.3.3 The Regulations require automatic safety devices to be fitted when davits are recovered by the action of falls by power. For such davit installations incorporating winches with built-in motors, safety devices should be fitted to each arm unless full compensating gear is fitted. Where a portable motor is used, the safety device on the davit arm nearest to the winch operator may be omitted.

18.5.3.4 The safety devices should be of a design acceptable to the Nominated Body and should be set to operate so that the davit arms come to rest at least 300 mm from the stowed position. Setting of the safety devices should be checked by the surveyor after installation on the ship.

18.5.3.5 If arrangements are provided to secure the davit arms in the stowed position of the boat such arrangements should be of a robust and simple design, and readily visible when in place with suitable provision for the device to be set in the open or detached position while the boat is being launched or recovered at sea. If the means of securing is by a detachable pin or similar removable item, storage after removal should be arranged on the davit in a place where it can be clearly seen.

18.5.4 Mechanically controlled single arm davits

18.5.4.1 Where mechanically controlled single arm davits are installed for use with inflated and other boats they shall be tested in accordance with Chapter 6, Part IV of Volume 2 - Testing of Life-Saving Appliances. Normally such davits are used for launching a dedicated rescue boat which is used for situations other than abandonment from ship. However if the boat launched is to be used

for marshalling and towing away liferafts in an abandon-ship situation such davits are to be tested for 10° trim plus 20° list either way for static load and for slewing with full load and slewing at the light condition.

18.5.4.2 The turning out gear should enable the boat to be turned out quickly and under full control from inboard to outboard position. The force needed on the crank handle of the turning out gear should be about 200 N and the radius of the crank handle should be about 300 mm. Stops to locate the arm at the inboard and outboard positions should be provided and the direction of rotation of the crank handle to turn out the arm should be clearly and durably marked at the operating position. It is important to establish that all crank handles can be utilised effectively throughout the radical and pivotal travel.

18.5.5 Launching devices (i.e. appliances other than davits)

Such devices need not be fitted with mechanical means of turning out, and particular attention should therefore be given to the arrangement of guys and cleats to control the device during turning out, and to secure it in the launching position. Single post type devices should incorporate means to prevent them being jerked from their sockets.

18.5.6 Liferaft launching appliances

18.5.6.1 The Regulations permit considerable scope in the design of liferaft launching appliances and the requirements of the preceding paragraphs in this section should be applied as appropriate.

18.5.6.2 It should be noted that if the mechanically controlled single arm design is used as a liferaft launching appliance the Regulations require operation under unfavourable conditions of trim and up to 20° of list either way. The drill for raft launching calls for the appliance to be turned out to its operating position before any rafts are attached, but the design should nevertheless be capable of being turned out with or against an adverse list and trim, with a load of 185 kg at the davit head. Prototype davits so loaded should be tested on a tilting platform to demonstrate that they may be satisfactorily turned out under the conditions required by the Regulations. Stops to locate the arm at inboard and outboard positions should be provided with this design, and the direction of rotation of the crank handle to turn out the arm should be clearly and durably marked at the operating position. Automatic release hooks or other arrangements for releasing the liferaft, should be submitted for acceptance by the MCA. See paragraph 7.6 for Liferaft Automatic Release Hook requirements. Where it is permitted in certain classes of ships to provide liferafts in place of the lifeboats and liferafts consideration may be given to the use of one of the liferaft davits, should davit-launched liferafts be carried, to launch and recover the rescue boat, providing an appropriate approved disengaging gear is also fitted to the boat or falls. The load on the davit when turning out the rescue boat with its engine, equipment and a launching crew of two persons will be in excess of the maximum load for a liferaft, and the turning

out gear fitted to those davits may require some modification in order to satisfactorily turn out the rescue boat. In this case, the davit should fulfil the strength requirements for a mechanically controlled single arm davit for handling the rescue boat as well as the liferafts under all required conditions of list and trim.

18.5.6.3 Additionally in the case of any combined launching arrangement for liferafts and a rescue boat it shall be demonstrated that the rescue boat with its full rescue boat complement of persons and equipment can be hoisted at a rate of not less than 0.3 metre per second. It shall also be demonstrated that this mass can be hoisted by means of the hand gear.

18.5.7 Free-fall lifeboat launching appliances

18.5.7.1 The requirements for free-fall lifeboat launching appliances are contained in Schedule 6, Part 1, paragraph 7 of MSN 1676(M).

18.5.7.2 The prototype/production testing together with the required installation tests are contained in Chapter 6, Part V of Volume 2 - Testing of Life-Saving Appliances.

18.5.7.3 The drawings submitted by the manufacturers should indicate the maximum boat weight including equipment, provisions and the number of persons it is certificated to carry. They should also indicate the maximum hoisting or pulling in weight which should include the mass of the lifeboat, equipment provisions and the hoisting complement of at least six persons.

18.5.7.4 In order to launch a free-fall lifeboat with its full complement of persons in conditions which are unsuitable for free-fall launching e.g. in shallow water or rocks or debris or ice on the water; a standby, or auxiliary davit, should be included. This davit and its associated winch shall also have the capability to hoist with at least six persons the free-fall lifeboat on board ship after any drill. This davit should generally comply with the requirements contained in Schedule 6, Part 1 of MSN 1676(M) as appropriate, except for the following:

- (i) The launching and hoisting are needed only for a maximum list of 5° and trim of 2°, both either way; and
- (ii) The launching and hoisting can be accomplished with ships power.

18.5.7.5 Winches for use with standby or auxiliary davits in free-fall lifeboat launching systems should comply with the requirements of Schedule 6, Part 1, paragraph 5 of MSN 1676(M) and tested in accordance with Chapter 6, Part I of Volume 2 - Testing of Life-Saving Appliances except for the following:

- (i) No hand hoisting facilities are expressly required; and
- (ii) No control of the winch is required from within the free-fall lifeboat but control from the deck is adequate.

18.5.7.6 It should be demonstrated (possibly by model tests) that the free-fall lifeboat may be effectively launched by free-fall and will clear the ship after launching against a trim of up to 10° and a list of up to 20° either way, from a height of 1.3 times the certificated height. If a model is used, the length of the model should be at least 1 metre.

18.5.7.7 A retaining device shall be fitted to a free-fall lifeboat to prevent accidental or premature release from the stowed position on the launching ramp. This device shall be easily removable during preparation for a free-fall launch and shall be removed prior to embarkation for free-fall launching.

18.5.7.8 Free-fall launching arrangement shall be capable of being tested without an actual launch of the boat in water.

18.6 Testing of davits and launching devices at the maker's works *(See paragraph 18.5.7 for davits and launching devices handling free-fall lifeboats)*

18.6.1 Details of the testing of davits and launching devices are contained in Chapter 6 of Volume 2 - Testing of Life-Saving Appliances.

18.6.2 Arrangements should be made to measure the deflection of the davit structure to ensure that no permanent set occurs and the results should be included in the surveyor's report. The whole davit structure including stands, frames or trackways should be inspected before dispatch from the maker's works but the static testing of trackways for davits of the overhead gravity type may be waived at the surveyor's discretion in cases where the members are moderately stressed and of comparatively simple construction from rolled channel or angle sections. The surveyor's report should indicate whether the trackways were included in the static load test.

18.6.3 An effective inspection and non-destructive testing procedure to eliminate faults in critical weld joints in lifeboat davit/launching installation, is to be undertaken following a recognised quality controlled procedure for detecting these faults. Certificates recording the results of these and subsequent tests are to be placed with the ships records.

18.6.4 After satisfactory testing the davits should be clearly and durably marked for identification purposes as follows:

DT	(Serial number)
.....	
ST	(Static test load)
.....	
SWL	(Safe working load)
.....	
.....	(Date of test)
.....	(Surveyor's initials)

The identification marking should be separated from any other information which the manufacturer may wish to mark on the davits.

18.6.5 When the lifeboat launching system is installed on board, the system may be assembled using components supplied from several different sources. A dossier should be placed on the vessel containing drawings of components, sub-assemblies and completed installation together with approved details and supporting certification. This dossier should be updated when the complete installation is tested and also when the components and sub-assemblies are tested or replaced.

18.7 Launching appliance winches
(See paragraph 18.5.7 for winches handling free-fall lifeboats)

18.7.1 Where winches are fitted to launching appliances or devices they should lower under the action of gravity and be fitted with a hand-brake also operated by the action of gravity.

18.7.2 The arrangement of crank handles should not rely on the action of springs for safe operation, and the throw-out method, employing a dog type engagement, should not be accepted unless the crank handle is mounted on a shaft which is not rotated by the moving parts of the winch.

18.7.3 Winch gears should be machine cut from steel or other suitable material. Cast iron should not be used for these parts.

18.7.4 The diameter of winch drums should not be less than 16 times the diameter of the fall wire. Adequate flanges should be provided at each end of the drums to accommodate the wire and prevent overriding of the falls. They should not normally be designed to accommodate more than three layers of wire, and winches fitted to serve rescue lifeboats should be limited to two layers of wire.

18.7.5 The ratchet design should not allow the direction of free rotation to be reversed by incorrect assembly. Ratchet gear should be fitted with at least two pawls or rollers.

18.7.6 Winches which hoist by means of an auxiliary drum wire driven from another powered device (i.e. 'wire-power' winches) are not acceptable.

18.7.7 Each winch design for which acceptance is requested should have a unique name or designation.

18.7.8 Winches serving liferafts should be provided with a manual rewind facility for rapid recovery of the light hook, which should be fitted to act directly on the winch drum, and isolated from the gear train when recovering the light hook.

18.7.9 Any crank handle(s) employed should not be rotated by moving parts of the winch when the liferaft is lowered.

18.7.10 Winches fitted to liferaft davits which also handle rescue boats must be capable of launching and recovering by hand the rescue boat, its engine and the number of persons the boat is certified to carry.

18.7.11 Portable hoisting units should be provided with means to transfer their torque to the winch frame.

18.7.12 Winches serving rescue boats or emergency boats should be fitted with fixed motors.

18.7.13 Where fixed electric motors are fitted to winches, the winches should be so arranged that it is not possible to lower the lifeboat with the electric motor engaged, unless the electric motor can withstand the speed of rotation corresponding to the maximum possible boat lowering speed.

18.7.14 The force required on the crank handle to recover the light boat should not exceed 200N and the radius of the crank handle should not exceed 400 mm.

18.7.15 The direction of rotation for hoisting by hand should be clearly and durably marked at the operating position.

18.8 Testing of winches at the maker's works ***(See paragraph 18.5.7 for winches handling free-fall lifeboats)***

18.8.1 Details of the testing of davits and launching devices are contained in the relevant parts of Chapter 6 of Volume 2 - Testing of Life-saving Appliances.

18.8.2 Following completion of all tests, the winch should be stripped for inspection. These tests should normally be witnessed at the maker's works by a surveyor, unless other arrangements such as reciprocal survey arrangements with other Administrations have been made.

18.8.3 The minimum load on single part tackle required to overcome the frictional resistance within the winch should be recorded.

18.8.4 Following satisfactory tests, each winch should be clearly and durably marked for identification purposes as follows:

DT	
.....	
ST	kg
LT	kg
.....	
.....	
.....	
.....	

(Serial number)
 (Static test load)
 (Lowering test load at
 which the automatic
 brake was adjusted)
 (Date of test)
 (Surveyor's initials)

This identification marking should be separated from any other information which the manufacturer may wish to mark on the winch.

18.8.5 It is desirable that the static test load should in all cases be based on the maximum design load of the winch.

18.9 Instruction manuals

The davit and winch makers should provide instruction manuals detailing the description of the davit and winch, operation for launching and recovery, and maintenance of the equipment.

18.10 Blocks and chains

18.10.1 The design of blocks should achieve a factor of safety of at least 6 based on the ultimate tensile strength of the materials used in their construction.

18.10.2 Metal blocks fabricated by a welding process should be stress relieved after welding and before proof testing. For use with wire rope falls the sheave diameter should be at least 12 times the rope diameter when using ropes of 6 x 36 construction or similar. Where less flexible wire ropes are proposed an increased sheave diameter should be adopted. Certain grades of malleable cast iron may be accepted as ductile materials for use in the construction of blocks as follows:

BS 6681:1986 Grade W40-05 for use only with manila or other accepted fibre rope falls.

BS 6681:1986 Grades B32-10 and B35-12 for use with either wire, manila or other accepted fibre rope falls.

18.10.3 All blocks must be proof tested to a load of 2.2 times the working load on the block with the test load applied over the sheaves, and should be covered by a certificate of test. The blocks should be clearly marked so that they can readily be identified by the particulars given on the certificate, which should state the proof load applied and the address of the premises at which the proof test was made. The certificate should be signed by the person responsible for the accuracy of the test

and for the particulars given on the certificate. The certificate, or a copy of it, should be included in the records on completion of the ship.

18.10.4 The lower fall blocks used with falls for rescue boats should be fitted with swivel links and it is recommended that such links should be fitted to the lower blocks used for lifeboats.

18.10.5 The cross section diameter and the diameter of the swivel link, ring or lower link plate should be compatible with the hook of the disengaging gear to which it is connected. Where the design so dictates, a chain suitably shackled may be interposed between the lower fall block and the ring or lower link plate.

18.10.6 The links, chains, shackles etc. should be of steel and manufactured in accordance with the appropriate British Standards as follows: BS 2902:1957(1985), BS 2903:1980, BS 3458:1962(1985), BS EN 818-1:1996, BS 4942:Part2:1981 (\equiv ISO 1835), Part 3:1981 (\equiv ISO 1836), Part 4:1981 (ISO 3075), Part 5:1981 (ISO 3076), Part 6:1981 (ISO 3077), BS 6304:1982 (ISO 4778) and BS 6968:1988 (ISO 3056) or other accepted specification, but such equipment manufactured to other equivalent national codes can be accepted at the Surveyor's discretion. All links, chains, shackles etc. should be proof tested to 2.2 times their respective working load and the results recorded on Form 86 prescribed by the Health and Safety Executive for the purpose of the Docks Regulations. (Other equivalent national forms may be used for this purpose). These forms should be included together with the actual test certificates for each individual component with the records on completion of the ship. All hooks, link plates, links, chains, shackles and swivels should work freely and bed fairly together without wedging action.

18.10.7 Any lugs, ears or handles attached to suspension chains or long links should be welded before proof testing, due regard being paid to the material involved and to any heat treatment required.

18.10.8 The safe working load of chains should ensure a factor of safety of not less than 6 based on the minimum breaking load for the chain.

18.10.9 To prevent the possibility of any problems resulting from the omission of heat treatment, normally undertaken during manufacture of alloy steel lifeboat hook suspension links and sling assemblies, hardness tests should be carried out on new components to confirm that the material has been suitably heat treated. The results of these tests should be recorded, together with particulars of the heat treatment, preferably in the form of a Certificate of Test. The Certificate should also include particulars of the material and the safe working load (SWL).

18.10.10 The surveyor should ensure that the chain can be identified and that its quality is indicated on the chain and recorded in the davit manufacturer's instruction book on the ship. If alloy chain is used the instruction book should also make it clear that the chains should not be periodically heat treated.

18.10.11 Those alloy steel lifeboat suspension links and chains already in use which do not have the required quality assurance records, should be hardness tested. The hardness test results should then be compared with the results of a similar grade alloy steel component that has had the documented heat treatment laid down in 18.10.9. If the comparative hardness reading is higher by more than 10% then the component should be replaced. Alternatively a sample may be taken and subject to a tensile test. If the total ultimate elongation measured during such a test is less than 20% then the material is too brittle and the component should be replaced.

18.10.12 All links, chain, etc. should be examined regularly by a person with a defined competence. A Certificate of Examination should be signed by that person.

18.10.13 When the lifeboat launching system is installed on board, the system may be assembled using components supplied from several different sources. A dossier should be placed on the vessel containing drawings of components, sub-assemblies and completed installation, together with approved details and supporting certification. This dossier should be updated when the complete installation is tested and also when the components and sub-assemblies are tested or replaced.

18.10.14 Officers and crew should be informed that there is a possibility of overloading the lifeboat davit structure if the lifeboat is embarked with tricing pendants attached. Embarkation should only take place when the lifeboat is bowsed in by the bowsing tackles and after the tricing pendants have been detached.

18.11 Falls

18.11.1 Wire rope falls

(See also paragraph 3.11.2.)

18.11.1.1 These should be as stated in Schedule 6, Part 1 paragraph 4 of MSN 1676(M) and a sample of each wire rope must be tested to establish its breaking strength and a certificate provided.

18.11.1.2 The method of attaching the wire ropes to the winch drums should be acceptable to the MCA, and samples of the arrangement should be subjected to a proof load test of 2.2 times the working load on the drum. Where the design allows for a minimum number of turns to remain on the drum, the above test may simulate such a condition. Attachments for the standing part of the wire rope, and other parts from which the boat is suspended, should be subjected to a proof load test of 2.2 times the working load on the attachment or other part.

18.11.1.3 When the final attachment to a fabricated structure takes the form of a welded lug it should be subjected to a proof test load of 2.2 times the working load on the attachment, but where, for instance, the standing part of

the fall is made fast round a substantial bollard forming part of a trackway or ship's structure, this test may be waived at the surveyor's discretion.

18.11.1.4 When the lower end attachment of a single part fall uses a socket connection this should be made in accordance with BS 463: Part 2: 1970 (ISO 3189/1, /2 and /3) Drop Forged Sockets for Wire Ropes, or other equivalent national code at the surveyor's discretion. In all cases the socket and rope when assembled should be subjected to a proof test load of 2.2 times the working load on the socket. The attachments of the ends of the rope falls should be of a type which does not allow water to lodge in contact with the wire ropes. For proper maintenance of wire rope falls it is important that the necessity for keeping them sufficiently greased over their whole length should be emphasised to Masters and Mates. Surveyors should make a point of seeing that attention is given to parts of the falls passing over fairleads, etc. which may be neglected.

18.11.1.5 Where bottle screws are used in fall arrangements, means of locking the screws should be provided.

18.11.2 Falls other than wire rope

18.11.2.1 Fibre rope falls should be good quality manila or synthetic rope of equivalent strength, durability and grip, complying with the relevant BS EN standards and marked in accordance with Appendix O and should be durable, unkninkable, firm laid and pliable. Surveyors should ensure that suitable rope is used and should note that the property of grip is essential, whilst stretch should be minimal in this application.

18.11.2.2 The breaking load must be at least 6 times the maximum load when hoisting or lowering, and fibre rope falls should not be less than 20 mm diameter. Rope falls should be able to pass freely through a hole 10 mm larger than the nominal diameter of the rope. Where an owner considers it impracticable to provide wire rope falls and winches in accordance with the Regulations, consideration by the MCA will be given to the acceptance of fibre rope falls without winches, in cases other than rescue boats, where the distance from the boat deck to the lightest sea-going waterline is less than 5 metres.

18.12 **Span wires and lifelines**

18.12.1 Where partially enclosed lifeboats are carried a span wire must be fitted between the heads of each set of davits and so positioned that when the boat is in the lowering position the span is as near as practicable over the centre line of the boat. Galvanised steel wire rope 20 mm diameter is suitable for this purpose. Thimbles should be spliced into each end for attachment by means of shackles to lugs provided on the davit heads. Care should be taken that span wires are not set up so tight as to exert a pull on the davit arms.

18.12.2 At least two lifelines should be fitted to the span wires. They should be of 20 mm to 24 mm diameter good quality manila rope, or synthetic rope of equivalent strength complying with the relevant BS EN standards and marked in accordance with Appendix O. Surveyors should note that the property of grip is essential in this application, and care should be taken to ensure that suitable rope is used.

18.12.3 Lifelines should be seized to the span wire at least 300 mm away from the davit heads, so that the top blocks are not fouled and should be long enough to reach the water with the ship at the lightest sea-going draught and with an adverse list of 20°. Overhead knots should be put in each lifeline at intervals of approximately 2.0 metres and account should be taken of the additional rope used in forming the knots when measuring off the length. Light lines should be attached to the lifelines at the level of the boat stowage position to enable them to be brought in to the ship's side when the davits are in the position of full outreach.

18.13 Recovery of rescue boats

18.13.1 The requirements for the recovery of rescue boats are laid down in Regulation 55(4) and 76(1) and (2) of the Merchant Shipping (Life-Saving Appliances for Ships Other Than Ships of Classes III to VI(A)) Regulations 1999 and Schedule 6, Part 2, paragraph 3.4 of MSN 1676(M). In addition "rapid recovery" also implies safe and rapid engagement of the recovery ring or link into the lifting hook.

18.13.2 The requirements for the recovery of inflated boats are laid down in Schedule 3, Part 3, paragraph 2.1.1 of MSN 1676(M) and Schedule 6, Part 4, paragraph 2.1.1 of MSN 1676(M) and in Schedule 11, paragraph 5.1 of MSN 1677(M).

18.13.3 Where considering the strength and testing of recovery strops, hanging off pendants and the davit structure, a working load consisting of the weight of the rescue boat, equipment and provisions plus a weight equivalent to the number of persons the boat is certified to carry should be used. Should owners wish to provide special recovery arrangements for boats other than rescue boats, such arrangements should be not less efficient than the arrangements detailed for rescue boats.

18.13.4 Rescue boats need not be fitted with special recovery arrangements if the lower fall blocks are fitted with a suspension chain or length of wire of suitable strength and flexibility, and suitable means of attachment to the lifting hooks. The length of wire or chain including the conventional long link attachment for the lifting hook should be at least 1.25 metres in length for this purpose. Single falls may also be accepted provided that the bob weight does not exceed 7 kg.

18.13.5 Hanging-off pendants should have a factor of safety of at least 6 based on the breaking strength of the wire.

18.13.6 Recovery strops, which may be of nylon or other suitable material accepted by the MCA, should have a factor of safety of at least 6 based on the breaking strength of the strop.

18.13.7 In the case of recovery strops and hanging-off pendants, a test certificate should be provided.

18.13.8 Hanging-off pendant attachments on the davits should be designed with a factor of safety of at least 4.5 based on the ultimate tensile strength of the material. The davit structure should maintain the factor of safety of 4.5 when hanging-off the working load, with the ship trimmed up to 10 degrees and listed up to 20 degrees either way.

18.13.9 Where the recovery arrangements entail disembarkation at a deck other than the embarkation deck, bousing arrangements should be provided for both decks.

18.14 Electrical lighting

18.14.1 General

18.14.1.1 In the Merchant Shipping (Life-Saving Appliances for Ships Other Than Ships of Classes III to VI(A)) Regulations 1999, Regulations 34(1), (2), (3) and 4, Regulations 50(4), 50(5) and 53(8) and Regulations 71(4), 71(5) and 74(8) specify the requirements for the provision of electric lighting for life-saving purposes on ships of various classes.

18.14.2 Source of power supply

18.14.2.1 The sources of supply to the lighting systems at muster and embarkation stations should be such that a fire, or other casualty, affecting either the emergency source of power and its switchboard, or the ship's main source of power and switchboard, will not leave any area without illumination. Supplies to lighting circuits should not be routed entirely through the emergency switchboard or space containing the emergency source of power and some should, in all cases, be taken direct from the ship's main source of electric power.

18.14.2.2 The power supply for the illumination of the area of water into which survival craft are to be launched is to be fed from the emergency switchboard only.

18.14.2.3 On Ro-Ro passenger ships built on or after 1 August 1988, the source of power for continuously charging the lighting units for the required supplementary emergency lighting system should be taken direct from the emergency switchboard.

18.14.2.4 For passenger ships of Class I, II or II(A), and cargo ships over 500 gross tons engaged on international voyages, the illumination of muster and embarkation areas and of all access passageways leading thereto, also of the area of water into which survival craft are to be launched, should be of the 'maintained' type. That is, the lighting circuits should have a power supply available at all times from either the main source of power or, when that fails, from the emergency source so that in an emergency adequate lighting of all locations required to be so served will be assured. 'Maintained' systems have the advantage that, in general, failure of lamp filaments, fuses etc. will be obvious before an emergency occurs. All emergency lights should bear a distinguishing mark for identification.

18.14.2.5 On passenger ships, switches for emergency lighting circuits should be so sited as to be outside the control of passengers.

18.14.3 Type of lighting

18.14.3.1 Fluorescent or other discharge lamps should not be used for emergency lighting unless it can be shown that they will operate satisfactorily (including re-striking) at such reduced voltage of supply and at such lower limits of temperature as may be expected to occur in an emergency. For such lighting in interior locations, the lamps should strike and provide adequate illumination when the voltage is 10% less than nominal and when the ambient temperature at the fitting is 0°C. For such lamps proposed for exterior use, the corresponding parameters should be a 10% reduction in voltage and an ambient temperature at the fitting of -20°C.

18.14.3.2 Certification by the lamp manufacturer that these conditions are fulfilled may, at the surveyor's discretion, be accepted.

18.14.3.3 In general, the minimum wattage for emergency lights should be 25 watts in alleyways, stairways and exits, 40 watts for boat preparation areas and 60 watts for overside lighting. In individual cases, surveyors may decide, by practical test if necessary, that safe access of all persons on board to the launching stations or stowage positions of lifeboats and liferafts can be achieved by having combinations of emergency lights of greater or lesser wattage.

18.14.3.4 Supplementary emergency light fittings should be of a type acceptable to the MCA. (See type approval specification).

18.14.3.5 Boat preparation and overside lighting should, wherever practicable, be secured to the ship's structure. Lights fitted to the arms of davits or launching devices are generally unacceptable, because of the ineffective illumination due to the shadow cast by the boat or raft and because they can introduce electrical supply difficulties and shock hazards if damaged. Boat preparation lighting should be arranged to illuminate entrances of lifeboats, interiors of partially enclosed lifeboats and rescue boats so that they may be

readily prepared for launching, in addition to illuminating the winches and the deck area surrounding the davits.

18.14.3.6 In small ships where it is impracticable to fit permanent lighting, portable battery lamps may be accepted provided that they are battery hand lamps of the rechargeable type. Electric torches are unsatisfactory for this duty.

18.14.3.7 In tankers and bulk carriers where lighting is not otherwise provided for the illumination of any inflatable liferaft stowed forward, it will be sufficient for the owner to provide an accepted type of hand safety lamp or a safety torch in order to illuminate the liferaft stowage. The hand safety lamp is preferred as it can usually be hung or clipped at some convenient position to illuminate the liferaft stowage.

18.14.4 Application of the lighting requirements to ships

18.14.4.1 *Ships registered before 26 May 1965*

	Age of ship	Arrangements required
1.	Ships registered between 26 May 1962 and 25 May 1965 inclusive and ships the keels of which were laid before 26 May 1965 and registered on or after that date.	<p>A chargeable battery system operated automatically or manually to provide emergency lighting on failure of main power. Manual systems may be operated in separate sections from two or more individual central positions. Provisions to be made for charging batteries in situ or by removing to a central charging position.</p> <p>The batteries to be of sufficient capacity to provide adequate illumination within the accommodation and at exits (minimum power per lamp 5 watts) and at boat stations (minimum power per lamp 24 watts) for at least three hours.</p>
2.	Ships registered between 26 May 1952 and 25 May 1962 inclusive.	<p>Accommodation spaces to be fitted with a combination of chargeable lamps (minimum power per lamp 5 watts) and self luminous signs directing to exits and boat stations whilst chargeable lamps (minimum power per lamp 24 watts) to be provided at boat stations. The lamps, which may be independent of a wiring system, to provide necessary illumination for at least three hours.</p>

(i) The requirements above are considered the minimum requirements, but in assessing the number and position of the lamps and self-luminous signs the surveyor should be guided by the principle behind these requirements. Namely, to give direction from any point within the accommodation passageways to an exit route with one alternative route to the boat deck, or the open deck leading to the boat deck, with all the main lighting extinguished bearing in mind that the self-luminous signs to the specification given will be visible at a distance of at least 15 metres when new, and that the 5 watt lamps can be expected to give spread of light approximately 6 metres each side of the fitting. The lamps should not be fitted adjacent to the luminous signs, otherwise the effectiveness of the latter will be nullified.

(ii) Self-luminous signs which should be of types accepted by the MCA should generally comply with BS 5499: Part 2: 1986 and should be only 'EXIT' with minimum letter height of 76 mm and arrows ' -> ' with minimum arrow length of 127 mm. The source should not exceed 15 curies and the initial brightness at least 0.51 candelas per square metre which should permit a useful life of 10-15 years. At resurveys the surveyor should be satisfied, if necessary by actual tests, that the signs are still effective having due regard to the distance from which the signs will be viewed in each particular case.

(iii) The 'chargeable' lamps may be portable or fixed but if the former the fitting should be such as to prevent the lamps being inadvertently removed or used for other purposes. The batteries used should, in general, be the rechargeable type with appropriate charging facilities provided in the ship, but consideration may be given, exceptionally, to the use of dry batteries provided the owners can satisfy the surveyor, having regard to normal voyages of the ship, that replacement batteries can be readily obtained and that exceptional deterioration will not occur due to climatic conditions. Consideration should be given to the fitting of self-luminous marker buttons at the lamps or switching points.

(iv) In some cases, the fixed 'chargeable' lamps will be of the type that incorporate automatic changeover to battery operation, in the event of failure of the main lighting. Where this type of emergency lighting is used, the fitting of self-luminous signs may be dispensed with provided the surveyor is satisfied that the number of lamps fitted will adequately illuminate the areas required to be covered.

18.14.4.2 *Ships built on or after 26th May 1965 (see MSN 1672).*